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STUDIES OF THE RELATIONSHIP BETWEEN EMOTIONAL FACTORS AND RHEUMATOID ARTHRITIS¹

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The half million beds occupied by individuals suffering from psychiatric disorders have long been considered as indicative of the prevalence of mental disease. This is a staggering figure in comparison with the number of hospital beds occupied by individuals suffering from other disorders. Ordinarily one does not compare the disability produced by mental disorders with that produced by other chronic illnesses. In the State of Massachusetts alone Gregg(1) reports that there are 145,000 individuals afflicted with arthritis, 120,000 of these being over the age of forty. This constitutes a sizable percentage of the population over the age of forty and includes many people skilled in various trades or professions. Using Gregg's figures, if one were to compare the number of individuals disabled by arthritis with the number incapacitated by mental disease, it is apparent that one would find a much greater loss of man-hours in the former group than in the latter. One might even postulate that the man-hours of skilled or professional work lost by the arthritics during the past year exceeds by far that lost by unsettled labor disputes.

The increased interest in psychosomatic medicine manifested during the last ten years has stimulated studies in many somatic disorders, including that of arthritis. As early as 1909 Llewlyn-Jones(2) remarked that psychic shock might precipitate attacks of arthritis. He also referred to comments by Remak and Charcot published in the previous century suggesting a nervous origin for rheumatism. The latter two investigators

were more interested in a neurogenic explanation, that is, a neuropathological than in a psychogenic. Following this suggestion a number of investigators commented on the possible relationship between emotional stress and arthritis. Groddeck(3) described a case of eighteen years' duration cured by psychiatric treatment. Emerson(4) (1929) expressed the belief that emotions seemed to play some part in the development of atrophic arthritis. Pottenger(5) found nervousness and depression present in 74 per cent of 50 cases studied, while Thomas(6) found that all of 31 cases interviewed showed a fairly severe emotional disturbance of one kind or another preceding the development of the joint disease. A number of investigators comment on the personality types found in arthritic patients. Jelinek(7) reported a small group of arthritics and emphasized that they were introverted, striving, discouraged individuals with problems in social or domestic adjustment. The personality types encountered in arthritics were also studied by Nissen and Spencer(8) with the conclusion that the schizophrenic and the arthritic are very similar in personality structure, with the former escaping from reality by phantasy and the latter by somatic or physical pathways providing functional disabilities. Ellman and Mitchell (9) offered somewhat similar conclusions in respect to the atrophic arthritics in whom schizoid features and morbid anxiety were predominant, whereas in the hypertrophic arthritic there was a slight predominance of the syntonetic personality. Although Ellman and Mitchell(9) did not consider the problem of the psychic origin of the disorder settled, they suggested that mental and arthritic disorders are both evidence of a general biological inadequacy. McGregor(10) studied 113 of the 500 cases reported by Nissen and Spencer(8) as "non-specific arthritics." Of this group one-half were found to have been emotionally unstable

¹ Read at the ninety-eighth annual meeting of The American Psychiatric Association, Boston, Massachusetts, May 18-21, 1942.

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all of their lives and in just under one-half an exacerbation of joint symptoms followed emotional crises. One-half had experienced years of emotional strain and anxiety prior to the onset of the disease. The author concludes that "rheumatism without structural change is nearly always psychogenic, whereas certain classes of rheumatism in which structural change is evident, psychological factors are found with great frequency and it appears to be closely related to the onset and exacerbations." It is noteworthy that Thomas (6) did not find any particular personality type in his series of 31 cases but depressive reactions were frequent.

More recently several investigators have attempted to establish a statistical relationship between emotional stress and the onset of illness. Cobb, Bauer and Whiting (11), using the Meyer life chart method, found that in 50 individuals suffering from this syndrome, 31 presented histories in which there appeared to be a close temporal relationship between life stress and the arthritis. In 12 patients the relationship was doubtful; in 7 there was no apparent association. The authors concluded that the environmental stress, especially poverty, grief and family worry, seemed to bear more than a chance relationship to the onset and exacerbations of rheumatoid arthritis. In a group of 25 controls with varicose ulcers only 3 showed a coincidence of the onset of ulceration with social stress.

Stein-Lewinson (12) studied the handwriting in a mixed group of arthritics and concluded that the personality pattern was fundamentally one of a weak person who over-taxed his inadequate amount of aggressive energy, had a low emotional threshold, was over-sensitive, and had a strong desire for protection, the conflict being between the infantile defensive aggressiveness and the persona. Booth (13) studied the same group of individuals by the Rorschach method, demonstrating thereby that the arthritic was inclined to be on the defensive, concerned with self-protection and very susceptible to emotional stress. Booth (13) felt that the organic symptoms had a psychological significance leading the individual to be concerned with his frustrated motility and physical symptomatology.

Assuming that there is a psychogenic factor, this must act through some physiological mechanism. Burt, Gordon and Brown (14) studied 50 cases of rheumatoid arthritis and found that 26.5 per cent gave a history of worry and anxiety. A study of the oculo-cardiac reflex, sweating, intestinal function and blood pressure indicated that these individuals had sympathetotonic tendencies determined congenitally or acquired by emotional shock. They concluded from their review of the studies of the vegetative nervous system that these individuals were actually amphotonic, possessing irritable and unstable autonomic nervous systems characteristic of psychoneurotics in general. Gask and Ross (15) found that after sympathectomy in arthritic patients there was an improvement in the peripheral circulation with increased warmth and vasodilatation. They considered the operation indicated in some cases of rheumatoid arthritis. Brown (16) observed the capillaries after sympathectomy and found an increase in the number of capillaries per unit area of skin with an increase in surface temperature, thus corroborating the work of Gask and Ross (15).

In 1930 Wright and Pemberton (17) demonstrated that the initial skin temperature in arthritics was lower than that of the average subject and that it was less responsive to changes in the environmental temperature. The authors concluded that there must be a disturbance of capillary flow, presumably on a vasomotor basis, the arthritic being less labile to adaptation than the nonarthritic. This investigation was followed by observation of the capillaries by Kovacs, Wright and Duryee (18), showing that the low temperature was produced or accompanied by slow capillary flow, there being a higher percentage of small constricted capillaries in the rheumatoid group than in the osteoarthritic. Pemberton and Skull (19) made a further study of the capillary picture in such patients and noted that the flow was slower, more uneven and more varied in the arthritics than in the normals. Stasis in the capillaries was observed in 25 per cent of the arthritics as compared with but 2 per cent of the normals. The authors concluded that the vasoconstriction might be present for a long time without organic consequences, but that if

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long sustained it could produce errors in local metabolism and thus lead to phenomena characteristic of inflammation.

Mittleman and Wolff (20) were able to demonstrate a definite drop in skin temperature under experimentally induced emotional stress. In view of their findings and the above reported changes in capillary flow, it seemed advisable to consider the possibility of emotional stress acting through a disturbance in circulation. Skin temperature studies seemed to offer a means of approach to this problem.

METHOD

The room in which the studies were carried out was partially sound-proofed and provided with thermostatic control. The ideal temperature was considered to be 85 degrees Fahrenheit. Readings of skin temperature were obtained by means of the Hardy (21) radiometer. The patients were placed in a comfortable bed with the sheet covering the legs and trunk. The points selected for study were the mid-phalangeal joints of the third and fourth digits and the dorsal metacarpal regions of both hands. This selection afforded a check on possible technical errors as well as readings from both articular and non-articular areas of the hand. Each patient was subjected to a series of studies. The initial observation permitted the patient to become accustomed to the procedure and provided the operator with a record of the patient's reactions under the controlled environment. The social history was not obtained until subsequent to the first study, in order to avoid any sensitization on the part of the patient. During the second period of observation the patient's peripheral temperature was permitted to stabilize and the operator then attempted to induce emotional tension or stress by promoting a discussion by the patient of conflictual material or emotionally traumatic experiences. After a variable period, relaxation was suggested and readings continued until the peripheral temperature was again stabilized at or near the previous level. Additional periods of observation were carried out as indicated, all arthritic patients being subjected to a special study during which the only irritating factor discussed was the patient's reaction to the disability produced by the disease.

MATERIAL

Unquestionable cases of rheumatoid arthritis were selected for the study. Those individuals who had active synovitis with increased local heat in the joints of the hands or wrists were excluded. All patients studied had involvement of extremity joints and in 4 there was also spinal involvement. The ages varied from eighteen to sixty-seven. The duration of the illness varied from four months to sixteen years, 21 having had the disorder for one year or more. The sex distribution was relatively equalized, with 11 females and 14 males.

The control group was composed of individuals hospitalized for various reasons, such as: paroxysmal convulsive disorder, diabetes mellitus, obesity, non-toxic adenoma of the

TABLE I

REACTIONS OBTAINED UNDER INDUCED EMOTIONAL STRESS, BASED ON THE READING OBTAINED OVER THE MID-PHALANGEAL JOINTS OF THE RIGHT HAND.

Decrease in skin temperature in degrees centigrade	No. of arthritics	No. of non-arthritics
3.0 or more.....	3	0
2.0-2.9	3	6
1.0-1.9	10	7
0.5-0.9	3	6
0.0-0.4	6	6
Total	25	25

thyroid, and orthopedic defects. It was impossible to obtain a control group of the age distribution desired suffering from any one particular disorder. It was likewise impracticable to eliminate individuals who had psychoneurotic manifestations because of the prevalence of such reactions in hospital patients. An attempt was made to avoid all patients in whom one might suspect a disturbance in the autonomic nervous system. The age distribution was similar to that of the arthritics, as was also the sex ratio.

RESULTS

The results of the studies are summarized and grouped according to the intensity of the reaction which the patient presented under induced emotional stress as presented in Table I. With the exception of the 3 arthritics who showed a fall in temperature of more than three degrees centigrade, the dif-

ferences do not appear to be striking. In the control group the entire life period of each patient was covered in order to find sources of emotional stress, whereas in the arthritics attention was focused exclusively on that period immediately prior to the onset of the disease. Consequently, sources of emotional irritation satisfactory for use in the induction of emotional stress were found in 24 of the 25 controls. In contrast to this, but 12 of the arthritics were experiencing significant emotional stress immediately prior to the onset of the arthritis. Of these 12 patients, 11 had a fall in temperature over the midphalangeal joints of one degree centigrade or more, the drop in 4 being over two degrees, and in 2 more than three degrees. Of the 10 patients in whom there was no evidence of distressing factors at the time of onset, 7 had a reaction of less than one degree and 5 no significant change. In 3 patients the presence of emotional stress prior to the onset of the disease was considered questionable. Since the results as presented in Table 1 do not include this difference in the prevalence of emotional stress, it should be emphasized that the comparisons are quite misleading. As emotional factors cannot be mathematically weighted and tabulated, it was not considered feasible to include them in the table.

In comparing the two groups of patients it was found that there was no significant difference in the time required for the skin temperature to become stabilized in the controlled environment. A number of patients of both groups entered the laboratory with decidedly cold hands but this varied a great deal according to external factors, such as ward temperature, a recent bath or smoking. Occasionally an arthritic would become uncomfortable from the necessity of remaining on his back for a period of an hour and a half, and if any pain developed there was a tendency for this to interfere with the skin temperature study. In some instances this produced a definite drop, which was in one case localized to the hand of the extremity in which the patient was experiencing shoulder pain. This suggests the possibility that pain, if continuous, may produce a reflex interference with circulation. In another case the skin temperature dropped and failed

to rise as expected. Subsequently, the patient disclosed his suppressed desire to urinate, and relief of the bladder distention was followed by an immediate rise in skin temperature. On the basis of this observation one might postulate that the results of inadequate attention to a bed patient may produce reflex disturbances in circulation.

As illustrated in the graph presented in Fig. 1, the drop in temperature was ordinarily sharp and the rise following suggested relaxation nearly as abrupt. In many arthrit-

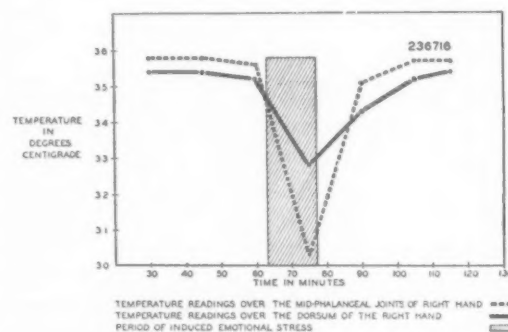


FIG. 1.

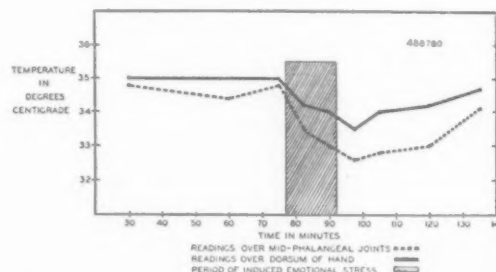


FIG. 2.

ics who had a moderate or pronounced reaction the rise in temperature was slow and prolonged. Such a reaction is illustrated in Fig. 2. This slow return to the normal level was never observed in controls.

The 12 arthritic patients who had experienced emotional stress prior to the onset of the arthritis had, in each instance, been subjected to this irritation over a period of months. For example, the patient whose reaction is illustrated in Fig. 2 had difficulty with a stepfather over a period of years. This was particularly intense during that year immediately preceding the onset of the arthritis and was aggravated when the patient lost a finger

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at work. The stepfather accused him of losing the finger deliberately in order to avoid contributing to the family budget.

A particular effort was made to determine whether the arthritis *per se* was a source of emotional stress. The majority of patients reacted to a discussion of the incapacitating nature of the disease. The intensity of this reaction was found to be particularly severe in young men who found themselves completely frustrated at the height of a courtship or when they were just becoming established in some particular trade or occupation. It is suspected that in these individuals there was some tendency toward a vicious cycle, the arthritis producing or aggravating emotional stress, which in turn through the disturbance in circulation thus produced, accentuated the disease process. The number of young individuals who presented such problems was insufficient to allow definite conclusions to be drawn.

COMMENT

Any investigation of the emotional factor in somatic disease is complicated by the difficulty of finding a satisfactory group of controls. Our control group did represent a cross section of hospital patients but certainly did not represent a cross section of the general population and consequently is not considered wholly satisfactory. It is impossible to postulate differences that might have been obtained if a larger number of patients had been available along with a greater number of satisfactory controls. In harmony with the findings of other investigators, approximately half of our arthritic patients had been experiencing severe emotional stress for an extended period immediately prior to the onset of the disease. Under the experimental situation a discussion of these problems did produce a change in circulation as manifested in the fall in skin temperature. Pain and visceral discomfort were found to have a similar effect. The differences noted between the arthritics and the controls, although suggestive, were not sufficiently striking to permit conclusive deductions. We cannot conclude that prolonged disturbances in circulation preceded the arthritis, nor if such were the case that a *locus resistantiae minoris* was created that per-

mitted or caused the development of the disease process. The slow return to normal after an induced drop in temperature suggests that these individuals do react differently, but on the other hand, this may be a result of the changes produced by the disease. It appears that this tendency to a prolonged disturbance in circulation secondary to emotional stress may have some influence on the course of the illness or in inducing exacerbations. We are forced to conclude that the importance of the emotional factor and its method of action in relation to rheumatoid arthritis remained undetermined but that there is sufficient evidence to warrant further investigation.

SUMMARY

Twenty-five rheumatoid arthritics and 25 control patients were subjected to studies of skin temperature changes under induced emotional stress. Suggestive but inconclusive differences were noted. Emotional stress was found to produce a drop in skin temperature indicative of changes in circulation. The importance of such a mechanism in the development of arthritis could not be conclusively evaluated but its influence appeared to be greater in producing exacerbations or in influencing the course of the illness. The significance of emotional stress and its method of action in regard to rheumatoid arthritis remain unsettled but the field is worthy of further investigation.

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PERSONALITY FACTORS IN PATIENTS WITH MUSCULAR DISABILITY¹

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It is generally recognized that somatic disease is often accompanied by emotional responses that can affect significantly both the symptomatology of the underlying somatic condition and the reaction of the patient to his various life situations. No study appears to have been made heretofore of the personality responses to various types of muscular disability, although the interrelationship between the status of structurally normal muscles and emotional reactions has been investigated. Bier(1) discussed the changes in muscular performance during various emotional states and Nicholson(2) and Williams(3) studied the effects of hypnosis. Jacobson(4) has shown that mental activity is accompanied by muscular change, that relaxation can be cultivated and that diminution of mental activity can be brought about by decreasing muscular tension. Schultz(5) developed a method of relaxation which was an outgrowth of work on hypnosis.

METHODS AND MATERIALS

The 67 patients selected for observation represented various types of muscular disease and included 15 with muscular wasting subsequent to acute anterior poliomyelitis, 3 with progressive muscular atrophy secondary to chronic anterior poliomyelitis, 6 with amyotrophic lateral sclerosis, 10 with progressive muscular dystrophy, 8 with myasthenia gravis, 5 with progressive peroneal muscular atrophy, 4 with myotonia atrophica, 7 with other types of muscular involvement, and

9 with muscular fatigability of psychogenic origin. Most of the patients had been observed for periods varying from two to six years. Personality studies were made by the psychiatrists, working in close collaboration with the internist.

In all instances the metabolism of creatinine and creatine was investigated since these data are of assistance in estimating the amount and extent of the muscular wasting. The urinary excretion of creatinine is related to the total functioning muscular mass of the body and can be used in estimating the amount of muscular wasting. In normal adults or in patients with muscular wasting restricted to certain muscle groups, practically no creatine is excreted in the urine and the retention of ingested creatine (creatine tolerance) is of such order that very little of an administered dose of creatine is excreted in the urine(6). However, in instances of widespread muscular involvement considerable amounts of creatine are excreted and the creatine tolerance is grossly impaired. Considerable amounts of creatine can be excreted in hyperthyroidism. Since the defect in metabolism of creatine resulting from hyperthyroidism can be considerably improved, or even completely abolished by the administration of iodine(7, 8), all patients with muscular wasting subsequent to acute anterior poliomyelitis and showing gross defects in the metabolism of creatine were given iodine for periods of several weeks to establish or rule out the possibility of an accompanying hyperthyroidism.

Similarly in myasthenia gravis these methods were of value. In most cases of this disease no significant change in the metabolism of creatine is found. However, an accompanying hyperthyroidism can seriously increase the muscular disability and induce gross changes in the creatine metabolism(9).

¹ Read at the ninety-eighth annual meeting of The American Psychiatric Association, Boston, Mass., May 18-21, 1942.

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In addition, the response to an injected dose of prostigmine methyl sulfate is an important aid in the diagnosis of myasthenia gravis. In some patients muscular fatigability of psychogenic origin simulates myasthenia gravis, and in others emotional factors greatly increase the disability. The fact that muscular fatigability and weakness due to myasthenia gravis are improved promptly although temporarily by prostigmine, whereas muscular fatigability of psychogenic origin is not, aided in the differentiation between these two groups of patients.

OBSERVATIONS

For purposes of brevity the data presented in this report are limited to case histories that illustrate some of the personality reactions which occurred with different types of onset and clinical course.

MUSCULAR DISABILITY OF SUDDEN ONSET

CASE 2.—The patient was a girl, aged 7, who had an attack of acute poliomyelitis with paralysis of the right leg at the age of 6 months. She had been able to get about and play freely except for a limp of the right leg. The right lower extremity showed moderate shortening, foot drop and considerable wasting and reduction in power of all the muscles. The daily urinary excretion of preformed creatinine showed a slight decrease that was proportional to the amount of muscular wasting. The metabolism of creatine was normal.

Psychiatric examination showed an intelligent young girl whose personality seemed not yet to have been significantly influenced by her disability, in spite of the fact that her parents had many superstitious, pseudo-scientific and mystical ideas. The case illustrates the common finding that onset of the disease in infancy seems to have little ascertainable effect on the personality during childhood.

CASE 6.—The patient was a divorced woman, aged 29. At the age of 2½ years she had an attack of acute poliomyelitis with paralysis of the left leg. Ever since that time she has walked with a moderate limp. The extremity showed moderate shortening and the muscles were atrophied and weak from the level of the mid-thigh downward including the foot. The basal metabolic rate was +10 per cent. The excretion of creatinine was about 1.0 gm. daily, the daily output of creatine was 0.070 gm. and the creatine tolerance 58 per cent.

Because of the emotional reactions and the laboratory data, the possibility of an accompanying mild hyperthyroidism was considered. Administration of syrup of hydriodic acid was followed by definite improvement in the emotional status and muscular fatigability. After treatment the basal metabolic

rate was +1 per cent and the creatine tolerance had increased to 85 per cent. The diagnosis was muscular wasting subsequent to an attack of acute poliomyelitis with accompanying mild hyperthyroidism.

She was an intelligent, aggressive, vivacious, over-talkative, prepossessing woman, who told of being moody and flirtatious. She craved the admiration of others and was conscious of having developed personal qualities to compensate for and distract attention from her deformity. She had had many heterosexual affairs without satisfaction from intercourse. She dwelt on the fact that her nine-year-old son had small genitalia and would therefore be criticized just as she was because of the marked wasting of her leg. She is characteristic of a group of patients who compensate for the deformity by development of other assets, either physical or mental and thereby achieve a constructive adjustment although personality distortions which interfere with interpersonal relationships may remain prominent. In her case sexual maladjustment was influenced by her illness though it was dependent on other factors as well.

MUSCULAR DISABILITY OF FAIRLY RAPID ONSET AND PROGRESSION

CASE 17.—The patient was a married woman, aged 28, with rapidly progressing muscular weakness subsequent to chronic progressive anterior poliomyelitis. Two years after onset of her disease she had become bed ridden. She had previously enjoyed good health and had been active in various forms of athletics. Disability first was noted in her hands but shortly after she noted weakness and fatigue in the legs. Practically all of the muscles of the body showed advanced wasting. The patient developed weakness of the respiratory muscles which made it necessary to place her in the respirator. The daily excretion of creatinine was 0.540 gm., the excretion of creatine 0.300 gm. daily and the creatine tolerance only 16 per cent.

Prior to the onset of her illness the patient was a successful and outgoing business woman. During the first year of illness her reaction was marked by periods of anxiety and depression. Coinciding with her transition from the partially disabled phase to the totally disabled phase she gradually developed an euphoria which helped her to keep up her interests and made her life more bearable. The euphoria persisted throughout an almost fatal respiratory crisis and many weeks in the respirator and seemed to be based upon the unshakable belief, amounting almost to a delusion, that some day a cure would be found for her. In marked contrast to this, however, the slightest inconvenience or disappointment in other matters brought tears and upset her greatly. It is as though her total fund of cheerfulness was so completely utilized in sealing off the significance of the disability from the remainder of the personality that none was left with which to meet the ordinary stresses of life.

CASE 28.—The patient was a graduate nurse, aged 30, with muscular weakness due to progressive

dystrophy year previously. She had developed weakness of the extremities at the time she was a child. She had considerable wasting of the body and hands and was creating a considerable output of

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dystrophy of late onset and rapid progression. One year previously the patient noted that she fell frequently. During the following 2 months she developed weakness of the legs and 5 months later noted progressive weakness and wasting of the upper extremities. The disability progressed steadily and at the time of her admission the patient was unable to get up from the floor unaided. There was considerable lordosis. Practically all of the muscles of the body with the exception of those of the face and hands were weak and wasted. The excretion of creatinine was about 0.800 gm. daily and the daily output of creatinine was 0.400 gm.

She had been an active, conscientious, sexually repressed woman, who enjoyed helping others. At first she accepted her illness fairly well, but became more depressed as she became more incapacitated. There was a marked increase in anxiety and depression and decreased capacity to help herself after being told by a physician at another hospital that she had a hopeless illness for which there was no treatment. Later, on admission to the New York Hospital, she was more cheerful because she felt that something was being done to understand her problems and treat her illness. There was no evidence that her emotional reactions increased the severity of her symptomatology.

This case illustrates the difficulty in adjustment and the emotional response with rapid progression of the disease and the inadvisability of bluntly telling the patient that there is no hope. Holding out the possibility of a treatment being found which may give some relief helps the patient to maintain a healthy mental outlook and function at his best level of performance.

MUSCULAR DISABILITY OF GRADUAL ONSET AND PROGRESSION

CASE 47.—The patient was a man, aged 33, with progressive peroneal muscular atrophy. At the age of 24 he noted that he was limping and that his left foot "slapped" the pavement when he walked. Later he noted slowly progressive weakness and wasting of the muscles of the feet and the lower portion of the legs. When standing erect the patient presented a "stork-like" appearance. The muscles below the knees were atrophied, the muscles of the calves tapering to a minimum just above the ankle. Flexion of the feet was most impaired, but extension was moderately good. The muscles of the thigh were large and strong. The metabolism of creatinine and creatine was essentially normal.

Before the onset of his illness he had been a successful plumber. During the first 2 years of his illness he felt resentful at being afflicted. He then cut himself off more and more from various activities, showed no desire to obtain work and lost contact with his friends. Whereas he had occasionally had sexual relations he now lost all interest in the opposite sex. He rationalized his ineffectiveness by ascribing it to the limitations imposed by his disease and expressed the feeling that his illness has increased his introversion and lack of aggressiveness.

CASE 16.—The patient was an unmarried woman, aged 28, with chronic progressive anterior poliomyelitis. Onset of symptoms in infancy and slow progression were unusual features. She did not walk until the age of 2 years and since then has always walked with considerable lordosis. From the earliest school age she noted weakness of the hands and fatigue of the legs. The muscular wasting and weakness progressed slowly but steadily and the muscles of the trunk and all four extremities, including the hands and feet, showed advanced wasting. There were numerous fibrillations. The daily excretion of creatinine was 0.700 gm., the output of creatine was 0.210 gm. daily and the creatine tolerance was 34 per cent.

The patient grew up with her slowly progressive disease, has known very little of any other kind of life and except for transient reactive sadness might be described as quite contented and normally cheerful. She kept herself well occupied. Her case illustrates the common finding that in such illnesses beginning in childhood there is an acceptance of the disability and relatively slight difficulty in adjustment.

MUSCULAR DISABILITY OF VARYING SEVERITY

CASE 34.—The patient was a housewife, aged 40, with myasthenia gravis of 11 years duration. Since the onset of her illness she had had generalized muscular weakness and had tired readily after slight exertion. She had had pronounced weakness of the muscles of the face and frequent diplopia. The excretion of creatinine and creatine was essentially normal.

On the whole she had adjusted fairly well to the progressive increase in symptoms, with some exacerbations and remissions. There was a mild rebellion against her disease in the form of resentment at times when prostigmine failed to give relief. Although practically totally disabled she kept up her interest in the radio, reading and being visited by friends. She obtained satisfaction from the comments of others that she had "marvelous courage." She frequently had considerable anxiety centering about the fear that she would choke to death. During exacerbations she felt very depressed. The improvement which followed a "water cure" indicates that suggestion may have helped her muscular performance.

CASE 36.—The patient was a man, aged 36, with muscular rigidity of life-long duration secondary to myotonia congenita. Since early childhood he had been unable to relax his muscles quickly after an initial forceful contraction. After a few contractions this defect disappeared only to reappear again after a period of rest. The disability was most evident in the hands. Emotional tension and exposure to cold increased the symptoms. Examination revealed the defect described. The muscles were well developed and prominent. The metabolism of creatinine and creatine was normal.

For many years he had operated a truck, a bus or a subway train. There has been a constant fear that

he would not be able to respond in an emergency. As a result he developed so much cautiousness that he possessed one of the best work and safety records in the service. When he had marked anxiety his muscles were more tense and his movements less efficient. He hid his disability from others and looked on his home as a haven when he could feel at ease. He felt that he had made a mistake in getting married and that the necessity of supporting a wife and four children kept him under a constant strain. Underlying personality traits had become accentuated to compensate for his disability and had helped him to achieve a good economic adjustment in spite of much anxiety.

MUSCULAR DISABILITY OF PERIODIC OCCURRENCE

CASE 44.—The patient was a male, aged 20, with familial periodic paralysis. He complained of periodic attacks of paralysis involving most of the voluntary muscles. The first of these attacks occurred at the age of 15. During an attack in June 1939 paralysis was severe and generalized for 3 days and there was abnormality of cardiac function. Without any premonitory symptoms the patient suddenly became unable to move the muscles of the arms, legs and neck. Consciousness and sensation were unimpaired. The metabolism of creatinine and creatine was normal.

He was a friendly, energetic, individual and although he was usually cheerful and optimistic he showed some anxiety and uncertainty concerning the outcome of his illness and became discouraged during exacerbations. He enjoyed sports and his favorite pastime was eccentric dancing for which he had won a number of prizes. Thus his clumsiness did not handicap him but rather served as an aid in maintaining a good social adjustment.

MUSCULAR DISABILITY OF PSYCHOGENIC ORIGIN

In order to emphasize symptoms which may be superimposed on those due to physical deformity and to demonstrate the emotional origin of some such symptoms, a group of patients with purely psychoneurotic illnesses have been included. In all of them, diagnosis of a muscular disease had been made erroneously at one time.

CASE 55.—A housewife, aged 31, illustrates the problem of diagnosis and the effect of psychotherapy. She complained of increasing fatigue and weakness over a period of 9 years. Symptoms began when she became engaged to be married to a man for whom she showed considerable emotional ambivalence both before and after marriage. For several years she had been treated for myasthenia gravis. This diagnosis could not be substantiated by detailed study of her physical condition. It was found that she could swim and dance without noting undue

fatigue, but felt considerable exhaustion when confronted with housework and the care of two small children. She developed insight into the fact that she could escape from unpleasant situations by the use of physical symptoms, modified her routine to include more recreation and showed great improvement.

DISCUSSION

In the analysis of the personality reactions, the following factors were found to be of more importance in determining the adjustment than was the clinical entity: The various psychobiological factors, which aside from the muscular disability, have operated in the formation of the personality make-up, the type of muscular disability (weakness, fatigability or incoördination), the muscles involved, and the physiological, economic and cosmetic significance of these muscles, the age when the muscular symptoms first appeared, the nature of the onset of symptoms (acute or insidious), the length of time the symptoms have been present, the course of the disability (constant, slowly progressive, rapidly progressive or variable). They may be thought of as environmental stresses requiring new adaptation from a constantly reacting and adjusting organism. Muscular disability induces no change in the basic structure of the personality, but accentuates underlying traits which have been determined previously by the constitutional make-up and environmental situation.

Contrasting problems of adjustment were presented by those with an acute onset of symptoms, and those with an insidious development of the illness. In the disability of sudden onset, there is a definite change from the status of muscular function before the disease began. The result is anxiety, which often decreases when the disease becomes chronic, or even disappears if the symptoms become arrested. When the onset is insidious, there is usually a gradual adaptation and a relatively mild emotional reaction to the illness. In this latter group, as long as disability is not marked, changes in routine of life can be made with facility unless marked psychoneurotic personality features have been present prior to the illness. A transient depression in reaction to the disability is often found, particularly when the individual is unable to carry out

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some activity at which he had previously been proficient. Compensation for loss of function may be made by the development of personality traits, such as conscientiousness, cautiousness, perseverance or excessive aggressiveness.

The type of muscular disability also influences the emotional reaction and method of adjustment. In many with weakness or fatigability which was sufficiently severe to interfere with an active social and occupational adjustment, apathy was present. In some of these cases the apathy itself prevented the carrying out of constructive activity which would have been possible had the emotional response been less severe. When the patient continues to take an interest in his occupation and other people, he may be diverted to a great extent from his symptoms until the handicap has become so great as to preclude normal activity. Resentment toward the affliction is seen in most patients at one time or another. Frequently, it is transferred to the environment in the form of irritability. Usually a good adjustment to incoördination is made by the substitution of more easily performed activities. Occasionally incoördination is used as an asset, as in one patient who obtained great satisfaction from eccentric dancing. A history of loss of libido accompanying increased muscular weakness was obtained in several cases. In most patients with sufficient weakness to make normal sexual intercourse difficult, there was usually acceptance of the situation without conscious emotional conflict. However, in some individuals there was mild secondary anxiety.

The part of the body involved was of importance in some patients. In general, the upper extremities were more essential to normal personality function than the lower extremities. The hands offered a more satisfactory means of expression and compensation than did the feet. Sexually, however, the lower extremities took on special significance as essential parts of the sexual equipment, both cosmetically and physiologically. In this connection a variety of intricate sexual adjustments and displacements was seen. When the part of the body involved interfered with the usual occupation, change to other work was usually possible. How-

ever, in a few patients deformity was used as an explanation for failure to obtain work and willingness to accept support from others. In those with narcissistic tendencies there was great sensitivity to muscular wasting itself, and sometimes a resultant development of anxiety, depression or resentment.

The course of the disease exerted a great effect on the emotional reaction and social and economic adjustment. In certain conditions, such as progressive muscular dystrophy, the increase in disability can be so insidious that the patient may be unaware of further progression for a considerable period. Patients with disability of this type usually were found to accept their handicap more readily, and appeared to adjust constantly to the slowly changing level in muscular function. In this group apathy and mild depression were common. In those with total disability, whether following an acute illness or one of insidious onset, the euphoria which seemed to help the patient tolerate his affliction was often superimposed on an underlying depression which he would occasionally show by expressions of hopelessness, crying spells, or even desire for death. When there was a constant subtotal disability, there was a wide variation in type of adjustment. These patients were confronted with the problem of being in contact with the outside world, yet being unable to compete on an equal footing with their fellow beings. Many were able to make an activity adjustment for practical purposes nearly equal to that of the environment. However, others reacted strongly with anxiety, depression, jealousy, discouragement and anger. In patients with variable or periodic symptoms during remissions, discouragement and anxiety may disappear only to return with exacerbations of the illness. A prolonged relatively mild depression is often found in those with gradually progressing disease, and in those with a severe unchanging chronic syndrome. In some of these, an euphoria which seems to be compensatory in character is helpful in accepting the seemingly hopeless nature of the illness. There may be a feeling that the future will bring improvement in spite of increase in severity of symptoms. Some have a blind faith that a miraculous power will aid them. Others

feel that eventually a medication will be found that will bring relief. To some degree the adjustment was determined by the possibilities or limitations of the disorder. For example, in muscular wasting due to anterior poliomyelitis, there was often an overcompensation in the nature of increased activity of the uninvolved muscles, both to compensate for the impaired function, and to detract from the defect. On the other hand, in myasthenia gravis compensatory overactivity which might result in a marked or even fatal increase in disability was not seen.

The age of the patient acted as an important factor, in that the psychic trauma was least marked in young patients who were still under the protective care of their parents whether the disease was acute or insidious in onset. The emotional difficulties of the parents frequently were found to be greater than those of the patients themselves. In children the cosmetic factor and the functional inferiority became of major importance as they passed through adolescence into sexual and social maturity. Sensitivity to the defect was developed during this period and set off a series of reactions which led to definite changes in personality.

Biochemical and pharmacological studies were of aid in the investigation of patients, particularly those who complained of weakness and fatigability that appeared to be out of proportion to the amount of muscular wasting. In some instances emotional factors were found to account for the symptoms. In 2 patients the administration of iodine was followed by improvement in the metabolism of creatine and in the muscular and emotional complaints, and thus aided in establishing a diagnosis of mild hyperthyroidism. Prostigmine was helpful in evaluating neurasthenic features and in making a positive diagnosis of myasthenia gravis. It was also found that prostigmine was less effective when the patient was under emotional stress. One outstanding example was that of a young woman who had muscular wasting resulting from an attack of poliomyelitis in childhood and who later developed myasthenia gravis complicated by pronounced personality changes.

Many of the patients were given various preparations (vitamins, hormones and other

drugs) for their possible effect on muscular function. Some patients reacted favorably with moderate subjective improvement each time a new substance was tried. Subjective improvement usually persisted for periods varying from 2 to 5 weeks, but gradually subsided on continued treatment. It is of interest that several reports on the alleged beneficial effects of certain vitamins in progressive muscular dystrophy and other conditions were based on observations made during the first 4 weeks of treatment. It is likely on the basis of extensive observations in the present study that the vitamins acted through suggestion or gave hope, and thereby improved the emotional status without changing the underlying muscular defects.

The recognition of emotional factors is of importance not only in diagnosis, but also in treatment. Rapport with an understanding physician can give much comfort to the physically handicapped individual. The physician in whom the patient has developed confidence exerts a powerful suggestive effect by his talk and manner on the ability of the patient to function at his optimal level. In some cases there may be an actual relaxation of muscles so that spasticity is decreased and fatigue lessened, enabling the muscles to work more efficiently. Anxiety, resentment and depression are decreased by allowing the patient to unburden himself to an interested listener. Thus, he may be helped to carry on in spite of obstacles. He should be encouraged to lead as active a life as is in keeping with the physical limitation. Practical advice about the management of his routine can be given. It may be necessary to change his occupation. In some cases a recommendation for special training in classes for the handicapped is indicated. Attention to interpersonal relationships in the home setting makes discussion with other members of the family desirable. This is particularly advisable in the case of children whose parents show anxiety. Psychotherapy is helpful to most patients with muscle disease but has the greatest promise for patients with muscular disability resulting from an acute attack of anterior poliomyelitis, because the wasting is not progressive and usually is localized.

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SUMMARY

In 67 patients with diseases involving the muscles the anatomical involvement, biochemical findings and personality factors were investigated. Many cases presented problems in diagnosis between structural disease of the nervous or muscular systems and psychoneurotic reactions. Emotional changes often were accompanied by altered performance of the muscles. When the symptomatology was more severe than could be explained satisfactorily by the physical studies, the psychopathological findings were demonstrated to be of importance in the development of the clinical picture. In some instances an original diagnosis of muscle disease was shown to be erroneous by proof that a psychoneurosis existed and the symptoms could be improved by psychotherapy. The type of adjustment in those with muscle disease depended on a complexity of factors, such as the personality prior to the illness, the age of onset and the type and the course of the disability. Suggestion played an important part in the symptomatic change after administration of various medications. Study of both the physical and personality factors

was found to be of value in the diagnosis and treatment of muscle disease.

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EMOTIONAL FACTORS IN ORGANIC DISEASE OF THE CENTRAL NERVOUS SYSTEM¹

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AND

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The occurrence of neurologic symptoms in a patient presenting no objective signs of organic disease of the nervous system leads the neuro-psychiatrist, ever alert to the importance of emotional and psychologic factors, to suspect that the patient's complaints are the manifestation of emotional conflict. If, in addition, the onset of the symptoms follow immediately or shortly after a psychologic trauma, there is further justification for considering the patient a neurotic or hysteric. While this assumption is often correct, some cases eventually develop further objective signs indicative of organic disease of the nervous system and the question arises as to whether the relationship between the precipitating emotional trauma and the initial symptoms was causal or merely casual.

In this paper, we present 10 cases in which neurologic symptoms first occurred in relation to some emotional disturbance or psychic trauma and objective neurologic signs were at first minimal or absent. Subsequently, the development of further objective neurologic signs led to the diagnosis of an organic disease of the central nervous system such as post-encephalitic Parkinsonism, multiple sclerosis, pseudo-sclerosis, dystonia musculorum deformans, or brain tumor.

CASE REPORTS

POST-ENCEPHALITIC PARKINSONISM

In 1921, a 35-year-old white man was greatly disturbed when he was blackballed for membership in a fraternal lodge and immediately thereafter complained of severe headaches, insomnia, tremors of the hands and depression. He had always been a worrying complaining type of individual. He was treated, by another physician, as a case of anxiety neurosis, with sedatives and psychotherapy,

with some improvement of his headache and insomnia which gradually cleared up after 6 or 7 months. The tremor of his hands, however, progressed and he continued to worry greatly about his "social disgrace" and the effect it would have on his business affairs.

When seen in 1925, it was noted that there was some masking of the facies and a suggestion of a Parkinsonian posture, in addition to the tremor of the hands. The case was considered one of post-encephalitic Parkinsonism. Within a year, he showed the classic features of this disease and began to have oculogyric crisis. His symptoms have slowly progressed and since 1940, he has been unable to walk.

MULTIPLE SCLEROSIS

A 23-year-old white painter, in 1937, while pacing back and forth in a hospital, anxiously awaiting his wife to give birth to their first child, suddenly became blind in the right eye. He was examined by an ophthalmologist who found no objective evidence of disease and his blindness was thought to be hysterical. In the course of a few weeks he regained his vision and was apparently well until 3 months later when, in a fit of depression following a violent quarrel with his wife, he made an attempt to commit suicide by jumping out of a window. Immediately thereafter, he became blind in the left eye and complained of his legs feeling weak. Again his symptoms were thought to be hysterical but in the course of the following 3 months the weakness in his legs became progressively worse, a tremor of the head and hands became apparent, and he lost control of his bowels and bladder. He was admitted to the Philadelphia General Hospital for study.

Neurological examination revealed horizontal and vertical nystagmus, slurring speech, intention tremor of the head, neck and hands, absent abdominal reflexes, and generalized hyperreflexia with bilateral ankle clonus, Hoffman and Babinski signs. He was unable to stand or walk. Visual acuity was reduced to 2/60 in each eye and ophthalmoscopic examination revealed temporal pallor of both discs. Lumbar puncture showed no abnormalities except for a colloidal gold curve of 111221000. The clinical diagnosis was multiple sclerosis.

A white male accountant was first admitted to the Philadelphia General Hospital in 1927 at the age of 25, complaining of difficulty in walking and jerky movements of his legs. These symptoms had been present for about 3 years, coming on suddenly at

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From the Neurologic and Psychiatric Services of the Philadelphia General Hospital, Philadelphia, Pa.

a time when he was under considerable emotional tension because his wife had run off with another man and placed their small daughter in residence with immoral people. The patient had since been involved in much vexatious and embarrassing litigation, trying to regain the custody of his child.

Neurologic examination revealed only tremor of the tongue, trembling of the entire body, and a peculiar disturbance of gait in that one leg was drawn across the other in suggestive scissors fashion; yet at the same time the patient would bang his heels heavily against the floor with each step. All the deep reflexes were hyperactive but there were no pathologic reflexes. Sensation was intact except for a questionable slight loss of vibration sense in the legs. The blood Wassermann was negative. Lumbar puncture showed no abnormalities. On psychiatric examination the patient was tense, very suggestible, and enjoyed soliciting sympathy. His trend of conversation centered almost exclusively about his marital difficulties. During his stay in the hospital, his symptoms improved although they would always become worse when it was suggested that he was well enough to return to work. He was discharged, one month after admission, with a diagnosis of psychoneurosis, anxiety and conversion hysteria.

He returned to the hospital a month later, complaining of a "dead" sensation in and weakness of the right leg. Examination revealed absent abdominal reflexes, generalized hyperreflexia, and inconstant unsustained ankle clonus. The plantar response was normal except on one occasion when it was reported as suggestively extensor in type. Vibration sense was lost in both legs and position sense was impaired in the left leg. At times, touch and pain sensation were entirely normal; at others, there was a vague spotty hypalgesia in all extremities. His gait was normal except occasionally it showed the same peculiar character noted at his first admission. Again his symptoms were more noticeable when it was suggested that he was well enough to return to work. The discharge diagnosis was still psychoneurosis, although the possibility of multiple sclerosis was considered.

He returned to the hospital in 1930 stating that he had been quite well until one month before when his right leg again became numb and weak, causing him to fall frequently. Examination showed a spastic gait, positive Romberg, ataxia of all extremities, absent abdominal and cremasteric reflexes, generalized hyperreflexia, and bilateral Babinski sign. Position and vibration senses were lost in both legs. All laboratory studies were negative. The diagnosis was multiple sclerosis. The patient has remained in the hospital since and has shown no improvement.

A 21-year-old white, married waitress, in January 1940, complained of weakness and numbness of the right hand of one month's duration. Her symptoms appeared the day after she learned her husband had been having an affair with another woman from whom he had contracted gonorrhea. Shortly thereafter, he deserted her for his paramour, whereupon her symptoms became progres-

sively worse. In May 1939, following the loss of her job, she had noticed a slight weakness and numbness of the right hand which persisted several weeks until she found new employment.

The only positive findings on neurologic examination were a questionable slight weakness of the right arm, diminished patellar and achilles reflexes and some sensory disturbances. The right arm was hypæsthetic to light touch except for a circular band of hyperæsthesia extending about an inch above and below the right elbow, and there was a similar zone of hyperæsthesia of the right side of the trunk from the clavicle to the nipple in front and in the scapular area on the back. The patient was depressed and worried over her marital situation.

In view of the history of onset at a time of emotional distress, the bizarre sensory findings, and the history of a prior attack during a previous period of emotional tension, her symptoms were considered hysterical, although the possibility of multiple sclerosis was noted.

When seen again, a week later, the numbness and weakness had spread to the left arm and leg. In addition to the previously noted neurologic signs, there was a definite horizontal nystagmus, slight temporal pallor of both optic discs, hypæsthesia of the left foot and a circular band of hyperæsthesia about the right knee. The blood and spinal fluid Wassermann tests were negative but the spinal fluid showed 67 lymphocytes and a colloidal gold curve of 0011100000.

Within the next 2 months, in spite of a reconciliation with her husband, her course was rapidly progressive. She developed intention tremor, spastic paraplegia, bilateral Babinski, urinary incontinence and visual failure. Later there was some remission of her symptoms and she was able to walk again in spite of a residual spasticity.

False Inflammation PSEUDO-SCLEROSIS

A white, married female was first admitted to the Philadelphia General Hospital, in 1915, at the age of 20, because of attacks of shaking and trembling of her entire body. These symptoms had appeared a few days after she had been sexually assaulted on the street by an alcoholic. Her past and family history were negative except that her father was a chronic drunkard and she had always been "high strung," "nervous," and of limited intelligence. Physical and neurologic examinations showed no significant abnormalities except for intermittent coarse tremors involving her entire body. It was noted that these tremors were greatly exaggerated by the presence of the attending physicians and nurses and ceased when the patient did not think she was being observed. In view of this observation, the onset following emotional trauma, and the otherwise normal physical findings, her symptoms were considered hysterical and she was discharged improved.

She was next seen in 1920 when she returned for a normal parturition. The same tremors were again noted and she was very fearful and depressed,

crying continually. Again her symptoms were considered hysterical.

In 1924, she returned to the hospital because the tremors had become progressively worse. Neurologic examination now revealed an explosive scanning type of speech, weakness of both lower legs, increased deep reflexes without pathologic reflexes, and intention tremor of all extremities. The previously noted jerky, irregular movements of her entire body were still present. Spinal fluid examination was negative. The diagnosis of pseudo-sclerosis was made. A slit lamp examination revealed the presence of a Kayser-Fleischer ring. For 10 years prior to death in March 1942, she was confined to bed. Autopsy showed degeneration of both lenticular nuclei and cirrhosis of the liver.

DYSTONIA MUSCULORUM DEFORMANS

A 31-year-old white male gas station attendant was first admitted to the Philadelphia General Hospital in October 1939 complaining of spasms of the body, difficulty in swallowing and talking and restlessness.

As a child he was always considered nervous and whenever he became excited; he would stutter, blink his eyes and shrug his shoulders. For some years he had lived with and been supported by a wealthy male homosexual, although he denied ever having any overt relations. He was always changing his work, never holding one position more than a few months. In 1937 he became engaged. Shortly before the day set for the wedding, his fiancé eloped with the man who was engaged to her sister, whereupon the patient promptly married the jilted sister. His marital adjustment was satisfactory.

In August 1938, at the time of the birth of his first child, he had severe spasms of blinking of the eyes, twisting of the neck and tremors of the body. These subsided spontaneously within a few weeks and he was well until June 1939 when his wife again became pregnant. At this time he was working very hard under a severe pressure and had considerable financial worries. He began to blink frequently, his face twitched, his mouth would screw up and he complained of heavy feelings in his forehead, palpitation, shortness of breath, feelings of suffocation, and vague gastric discomfort. He attended several hospitals in another city. All examinations were negative and always his symptoms were considered psychogenic in origin. With rest, mild sedation and psychotherapy, he showed some improvement but was never entirely symptom free.

On admission to the Philadelphia General Hospital, he showed torsion spasms of the face, neck and trunk, difficulty in swallowing and marked dysarthria. The only positive findings on neurological examination were generalized hyperreflexia and hypertonia. During his hospital stay he showed a variable course. At times he would be symptom free, and at others his symptoms were so marked that he could barely feed himself. It was noted that his symptoms would always become aggra-

vated following a visit from his wife. He was placed on atropine and scopolamine, and strong suggestive psychotherapy was given. In February 1940, he was discharged symptom free with a diagnosis of psychogenic tics.

He returned to the hospital in March 1941 stating that, during the past year, he had continued to have intermittent twitchings and spasms. These gradually became worse and for the past month he had been completely incapacitated. He was markedly depressed and threatened to commit suicide. Neurologic examination revealed marked dystonic movements of the entire body. He was given four hypnotic treatments under sodium amytal narcosis without relief. He was unable to feed himself and unless restrained would fall out of bed; so severe were his dystonic movements. On April 30, the right premotor area was ablated. Following operation, he was symptom free and was discharged on May 19, 1941. The diagnosis was dystonia musculorum deformans.

He was readmitted for the third time in December 1941, stating that he had continued well for about one month after his discharge, when the twisting movements returned. He had been to several other hospitals and consulted many doctors without relief. Examination again revealed marked dystonic movements of the entire body. Hypnosis with sodium amytal failed to reveal any material of psychodynamic importance. He has shown no improvement and is considered to be a case of dystonia musculorum deformans.

BRAIN TUMORS

A 45-year-old married housewife was first seen in the fall of 1941, complaining of poor vision in the left eye. She had always been a worrying highly emotional woman, whose married life was continually unhappy because of constant arguments with her husband. For many years she had suffered with insomnia and had fears that she might become blind. In June 1940, she began to have severe hot flushes and her menses ceased. Shortly thereafter, she experienced a sensation of a film over her left eye. This became progressively worse and in September she consulted an ophthalmologist, who found her visual acuity to be the same as at the time of her last refraction in 1935. New lenses were prescribed without relief. She also complained of a vague sensation of pressure in the left eye. In the course of the following 12 months, she consulted several other ophthalmologists, all of whom told her there was nothing wrong and her trouble was entirely "nervous." In October 1941, she returned to the first ophthalmologist, who found a marked falling off in visual acuity in the left eye, a contraction of the temporal field, and a marked central scotoma. X-ray of the skull showed complete destruction of the clinoid process and partial erosion of the right posterior clinoid.

When examined by us, aside from the ocular findings, the positive neurologic signs were limited to bilateral anosmia and a middle ear deafness on the left. The spinal fluid pressure was 110 mm.

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of water. Otherwise the spinal fluid showed no abnormalities. Pneumoencephalogram showed a definite filling defect in the cisternæ chiasmaticus and interpeduncularis, suggestive of a suprasellar growth. A transfrontal craniotomy was performed and an adenomatous cyst of the pituitary was evacuated.

A 46-year-old white baker was first seen in 1929, complaining of irritability, inability to concentrate, forgetfulness and vague gastrointestinal discomfort. He vomited frequently, and had short periods when his feet dragged and he would fall if he tried to walk. In the intervals between attacks, he had no difficulty in locomotion. His symptoms had come on 6 months before at a time when he experienced severe financial reverses, culminating in the loss of his business. He was a conscientious, hardworking, worrying type of individual. Physical examination was negative and the objective neurologic examination revealed only a slight coarse tremor of the tongue and hands, and a generalized hyperreflexia without any pathologic reflexes or motor weakness. He was very tense, anxious and concerned about his finances. There was no objective impairment of memory. The blood serology was negative and lumbar puncture showed no increase in pressure or any other abnormality of the cerebrospinal fluid. A tentative diagnosis of astasia abasia and anxiety neurosis was made. Two weeks after admission, he developed a marked erythematous lesion of the right buttock, which was considered nervous in origin. His attacks of difficulty in walking were always promptly relieved by the application of a few static sparks; but he continued to be tense, anxious and depressed. Three months later his temperature suddenly rose to 103°. Examination at this time revealed a slight haziness of the margins of both optic nerves and the cerebrospinal fluid pressure was 30 mm. of mercury. He rapidly became stuporous and died 5 days later. Autopsy disclosed a large hemangioblastoma of the right cerebellar hemisphere and multiple hemorrhages into the right parietal and left occipital lobes.

A 29-year-old medical student spent the summer, preceding his final school year, as an attendant companion to a mentally ill patient. The patient escaped and committed suicide. The student, thinking that he had been negligent, became depressed and began to have occasional attacks when he would suddenly turn pale and break out in a drenching sweat. Physical and neurologic examinations were negative except for a moderate hypertension, which was thought to be due to emotional distress. However, there was no improvement with psychotherapy and mild sedation. Several months later, he suddenly had a generalized convulsion. Neurologic examination revealed bilateral papilledema. He was admitted to a hospital for study but died before operation. At autopsy, a glioma was found in the floor of the third ventricle.

A 32-year-old married housewife consulted her family physician, because of amenorrhea of one month's duration, and was told that she was preg-

nant. On account of financial and domestic difficulties, she was most unwilling to have a child and became very tense, agitated and depressed. She immediately began to vomit everything she ate and complained of frontal headaches. Although she was promptly and vigorously treated as a case of hyperemesis gravidarum, her headaches and vomiting continued. She became dehydrated, confused and disoriented. Neurologic examination revealed no abnormalities but examination of the fundi showed bilateral papilledema of 4 diopters. The spinal fluid pressure was 70 mm. of mercury. A ventriculogram showed both lateral ventricles to be markedly dilated. Operation disclosed an inoperable cystic astrocytoma of the vermis of the cerebellum. She died 3 days later. Permission for autopsy was refused.

DISCUSSION

The cardinal features in this diverse group of neurologic disorders are the onset of symptoms shortly following an emotional trauma, the initial paucity of objective neurologic signs, and the later development of signs pathognomonic of structural neurologic disease. Consideration of the previous personality make-up often further confirmed the original impression of an emotional determination of the symptoms. Some cases showed prior evidence of an unstable integration, inadequate to bear the burden of super-added emotional stress. In those cases with a previously well adjusted personality, the severity of the precipitating trauma was sufficient to evoke a marked emotional reaction. In retrospect, the initial minimal neurologic signs might have been interpreted, in the absence of emotional trauma, as the earliest manifestation of a structural lesion, but in the intense emotional setting these signs were not sufficient to establish definitely the exact etiology.

What relationship, if any, exists between the initial emotional factors and the eventual development of the organic neurologic disease? Was the emotional factor causal, interdependent or merely coincidental? Rabiner and Keschner(1), in reporting 3 cases similar to ours, suggested that the evolution of some organic neurologic diseases may occur in two stages with an earlier psychic and a later organic phase. They offered the hypothesis that psychic factors may possibly, through the vegetative nervous system, produce structural changes in the central nervous system which would account for the

organic clinical picture. While such a hypothesis might in part explain the cases in which the organic phase became manifest long after the precipitating emotional situation, it is inadequate for those cases in which an extensive structural lesion must have been present from the onset. Moreover, although knowledge concerning the exact etiological cause of the various organic neurologic diseases, represented in our cases, is incomplete; we cannot without further substantiating evidence accept the explanation that emotional factors alone are capable of producing the structural lesion. Neither do we think the relationship is entirely coincidental.

We venture to speculate that, in cases similar to ours and those of Rabiner and Keschner, there is an interrelation between the structural and emotional phases. The organic disorder exists to a greater or less extent prior to the emotional trauma but has not yet evolved to a degree sufficient to give rise to symptoms. The occurrence of the emotional disturbance, acting as a precipitating factor, initiates certain physiologic and psychologic changes. Physiologically, there is a lowering of the "general resistance" and possibly an alteration in the vascular supply to the "locus minoris resistentiae," represented by the already present structural lesion, with a consequent acceleration of the development of the lesion. Psychologically, there is an increase in the individual's self preoccupation and an increasing awareness of bodily sensations hitherto ignored. By the interaction of these factors, clinical symptoms first become manifest. Continuance of the emotional stress further accelerates the progress of the lesion and eventually objective neurologic signs appear.

From the practical clinical standpoint, the cases presented emphasize that in spite of overwhelming evidence of an entirely emo-

tional origin, symptoms occurring without substantiating objective signs may ultimately prove to be manifestations of structural disease. From the therapeutic aspect this is important. While exclusive preoccupation with the emotional aspects may be justifiable in those cases in which there is no effective therapy, failure to recognize the structural basis is tragic, if prompt medical or surgical therapy might influence the ultimate outcome. We cannot too strongly stress the necessity of ever regarding the patient as an individual, in whom both structural and emotional factors are continually interacting in disease as well as in health.

SUMMARY

A series of cases of diverse organic diseases of the central nervous system such as chronic encephalitis with Parkinsonism, multiple sclerosis, pseudo-sclerosis, dystonia musculorum deformans, and brain tumor is presented. In these cases, the initial symptoms became manifest either during or immediately subsequent to some severe emotional disturbance or psychic trauma and the objective neurologic signs were at first minimal. As a result, the symptoms were attributed to emotional causes and only later after the objective neurologic signs had progressed was the correct diagnosis established.

The possible rôle of the emotional disturbances as an etiological factor in the production of the structural changes is discussed. It is suggested that the emotional trauma precipitates both physiologic and psychologic alterations which lead to the appearance of objective neurologic signs.

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SCHIZOPHRENIA AND DIABETES

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This is the clinical case report of a patient with dementia præcox in whom diabetes mellitus developed nine years later. As Reiter(1) first indicated, we believe the sequence of this endocrine disorder developing after the onset of this particular psychosis is unusual. This author pointed out that the syntonics, *i.e.*, the pyknics, developed diabetes mellitus because their habitus predisposed to the vegetative kinds of metabolic disturbances, whereas the leptosomes, *i.e.*, the asthenics, did not develop diabetes. Since Hofmann-Bang's(2) first detailed report of

in dementia præcox patients to be 11.9/100,000, whereas in all other patients it was 89.8/100,000; in other words, one-eighth as great. It is only fair to state that the diabetic death rate in the U. S. A. as a whole is approximately 23/100,000. The reliability of these statistics is open to question, of course. Many senile, presenile, toxic and infectious psychoses often are called dementia præcox, for example, and one asks what are the criteria for the diagnosis of diabetes; did the diabetes precede the psychosis, and when is diabetes listed as a cause of death? Never-

DIABETIC DEATH RATES IN SCHIZOPHRENIA

Year ending June 30	Total pts. in N. Y. state hosps.	Total D. P. pts. in N. Y. state hosps.	Total hosp. deaths from all causes	Total D. P. deaths from all causes	Total hosp. diabetic deaths	Total D. P. deaths due to diabetes
1930.....	47,140	29,523	4,195	907	21	5
1931.....	49,392	29,536	4,225	917	18	4
1932.....	52,364	31,257	4,488	965	17	4
1933.....	55,278	32,612	4,625	1,012	16	3
1934.....	57,323	33,759	4,828	1,048	22	7
1935.....	59,828	35,373	5,164	1,055	39	7
1936.....	62,767	36,504	5,280	1,061	29	4
1937.....	64,726	37,288	5,767	1,182	26	2
1938.....	66,572	38,359	5,630	1,115	32	2
1939.....	69,193	39,896	5,758	1,059	37	3
Total.....	584,583	344,107	49,960	10,321	257	41
Avg. yr....	58,458	34,410	4,996	1,032	25.7	4.1

a case of diabetes developing in a patient with schizophrenia, one of us has searched through a clinical experience of 15 years without encountering a proven case until this present one.

Statistical evidence of a conclusive nature is not available. However, indirect evidence bearing out our contention was elicited from the annual reports of the New York State Department of Mental Hygiene, in which diabetes is listed as a cause of death in the various mental illnesses in patients hospitalized in the New York state hospitals. We constructed a table to include the reports for the past 10 years, 1930 to 1939 inclusive. In this we found the death rate from diabetes

theless we feel that there is a relative reliability to the statistics indicating a significant difference in the incidence of diabetes mellitus in dementia præcox and in the other types of mental illnesses. Perhaps this report will stimulate careful revision and completion of the statistics if it serves to arouse interest in this problem.

CASE REPORT

R. A. was admitted to Kings County Hospital observation for the first time on June 17, 1934. His illness began insidiously about four years previous to admission with nervousness, seclusiveness, apathy and restlessness.

Family history was negative for nervous and mental diseases. He was born in New York City

on August 28, 1898. Birth and early development were normal. At the age of two, his mother died, and his father remarried. Progress in school was good, but for economic reasons he left high school after a few months to work in his father's office as file clerk and investigator, and continued in this job until his father's death, two years prior to admission. He enlisted in the army in May, 1918, and was discharged in November, 1918, with a disability. Apparently he was unable to make a good adjustment there. He had trouble with an army sergeant who is said to have kicked him, following which the patient developed hysterical episodes.

On admission he was restless and agitated, apprehensive, fearful and self-absorbed, and mumbled inaudibly in response to auditory hallucinations. He showed a general loss of interest, and impairment of judgment and insight. He said, "Those voices, I don't know what they say, they mix me up." He was committed to Kings Park State Hospital on June 23, 1934, where he remained until December 9, 1935, when he was paroled at the insistence of his relatives. His mental condition had become worse. He remained idle and seclusive, at times agitated and irritable. He was untidy and unkempt, occasionally wet and soiled, and reacted to auditory hallucinations. His responses to questions were inaudible mutterings. He was again seen on December 15, 1936 (at the expiration of his parole), and during his parole period he had remained mute, dull and apathetic without interest or initiative. He had to be fed and cared for like a baby. Laboratory findings showed negative sugar and negative blood Wassermann. Spinal fluid negative, Wassermann normal, colloidal gold normal, protein and cell count normal.

On March 10, 1941, he was again admitted to Kings County Hospital observation. In the interim he had continued to regress. He remained at home completely withdrawn and inactive, indifferent to everything, had to be dressed, washed and shaved. His family was no longer able to care for him. On admission, physical examination revealed an emaciated white male, mute and apathetic, with complete loss of interest in his environment. Pupils were equal, regular, and reacted to light and accommodation. Extra-ocular movements normal. Mucous membranes of conjunctiva and sclera showed moderate pallor. The teeth were dirty and carious. Tongue was coated, protruded in the midline. There was a small lipoma on the back of the neck. Chest was markedly emaciated but breath sounds were normal. Heart sounds were weak and of poor quality; no evidence of enlargement, no thrills or murmurs. Ventricle rate equal to pulse rate equal 90. Blood pressure 100/60. Abdomen showed a fecal mass in left lower quadrant, non-tender. No liver, kidney or spleen abnormalities. Extremities were thin and emaciated. Neurological examination showed essentially normal findings. Fundi showed normal discs and vessels. The admission urine revealed 4 plus acetone and 4 plus sugar. The patient was treated with 140 units of regular insulin (with orange juice to cover) over a period of

14 hours when the urine became negative for acetone and showed 1 plus sugar.

He was put on an 1800 calory diabetic diet and insulin 15-10-15-5. On this régime he remained acetone-free but the quantity of urine sugar varied from 1 to 3 plus in each postprandial specimen. The patient ate voraciously. Because of the emaciation his diet was raised to 2100 calories on March 28, to 2500 calories on April 2, and to 3000 calories on April 15. On March 25 the insulin was changed to 20-10-10-5, and this dosage was continued until discharge. Under this régime the patient remained acetone-free but the urinary sugar varied from day to day unpredictably. (See chart.) One of the difficulties in regulating this patient was the fact that his appetite became insatiable at times and the patient would steal food from other patients' trays and wolf it down. On one occasion his family brought him a bouquet of jonquils and he immediately began to devour it, chewing off large bunches before being stopped.

Glucose tolerance tests were done on three occasions and each revealed the typical diabetic curves with diminished tolerance and high levels at the end of 3-3½ hours. On March 14 and April 9, 100 gms. glucose were given after a fasting blood level was taken, and successive blood samples taken at intervals of ½, 1, 2, and 3 hours. On April 22, 50 gms. glucose were given and blood and urine samples taken simultaneously to discover the renal threshold for glucose. Glucose appeared in the urine between 164 mg. and 188 mg., proving that the threshold was normal. Fermentation tests proved that the sugar in the urine was glucose.

During the course in the hospital the patient would occasionally show mild attacks of hypoglycemia as evidenced by his appetite, pallor and sweating. At 9:00 P.M. on March 17 he suddenly went into a coma, and was revived with 50 cc. 50% glucose intravenously. Coming out of the coma after 2 minutes, the patient became talkative, communicative, answered questions clearly, and showed interest in his surroundings. The lucid interval lasted about 10 minutes and then the patient slowly withdrew back to his original seclusive state. His weight increased from 86 lbs. on admission to 96 lbs. on discharge on April 25, when he was committed to Brooklyn State Hospital.

Laboratory Reports.—X-ray of chest showed an old fracture of the rib, no pulmonary pathology. Electrocardiogram showed left axis deviation, and some evidence of myocardial damage. Blood count showed a mild hypochromic anemia. Blood Wassermann negative. Basal metabolism rate was unsuccessful since patient did not cooperate.

DISCUSSION

We have presented a case of schizophrenia in a relatively young male in whom diabetes mellitus appeared nine years after the onset of his mental symptoms. The case was observed over a long period and from the psychiatric viewpoint was definitely one of

schizophrenia, at present in a regressed state. From the endocrine standpoint, careful studies were made to determine the nature of the disturbance. Fermentation tests confirmed the nature of the sugar to be glucose; the renal threshold was normal, and glucose tol-

from them the diagnosis of the mental disease was often unclear. Often, complicating factors such as alcohol influenced the mental picture. Menninger(4), discussing the psychological factors in the etiology of diabetes, reported five cases of "psychogenic diabetes"

DIABETIC CHART FOR CASE OF R.A.

		Fasting Urine	Breakfast		Lunch		Dinner		Midnight	
			A. C. Insulin	P. C. Urine	A. C. Insulin	P. C. Urine	A. C. Insulin	P. C. Urine	Insulin	O. J.
Mar. 15	1800 cal.	neg.	0	4+	15	3+	25	3+	5	"
" 16	" "	15	1+	10	...	15	neg.	5	"
" 17	" "	1+	15	...	10	1+	15	2+	9 P. M. Shock	"
" 18	" "	10	3+	10	3+	5	neg.
" 19	" "	15	2+	10	1+	15	4+
" 20	" "	15	...	10	2+	15	2+	5	"
" 21	" "	15	1+	10	...	15	2+	5	"
" 22	" "	beg.	15	3+	10	1+	15	neg.	5	"
" 23	" "	neg.	15	3+	10	2+	15	neg.	5	"
" 24	" "	15	3+	10	1+	15	1+	5	"
" 25	" "	neg.	20	sl. tr.	10	neg.	10	neg.	5	"
" 26	" "	neg.	20	2+	10	1+	10	1+	5	"
" 27	" "	20	1+	10	1+	10	1+	5	"
" 28	2100 "	neg.	20	3+	10	neg.	5	3+	5	"
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" 13	" "	neg.	20	1+	10	neg.	10	neg.	5	"
" 14	" "	neg.	20	neg.	10	ft. tr.	10	neg.	5	"
" 15	3000 "	neg.	20	3+	10	2+	10	neg.	5	"
" 16	" "	neg.	20	2+	10	1+	10	2+	5	"
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" 21	" "	4+	..	1+	..	1+	..	neg.
" 22	" "	neg.	Tolerance Test		10	3+
" 23	" "	1+	20	1+	10	neg.	10	neg.	5	"
" 24	" "	neg.	20	3+	10	neg.	10	neg.	5	"
" 25	" "	neg.	20	3+	Discharged	

erance tests on three occasions revealed typical diabetic curves.

It is quite possible that a few of the reports presented by Masson(3) and by Menninger(4 and 5) may fit into this category, but in any case they were not discussed from this point of view. Besides, the studies were often incomplete, the case reports brief, and

in which the mental picture preceded the diabetes and where both diseases ran a parallel course. Of these, 2 were depressions; one a paranoid state appearing in a 43-year-old male with an alcoholic history, whose diabetes appeared 5 years later; one was a psychosis with paranoid delusions in a 35-year-old female five months post partum; and

one a paranoid schizophrenia in a 40-year-old white male who developed glycosuria one year later, following an attack of influenza. In another article(5) the same author discussing the inter-relationship between mental disorders and diabetes states: "Schizophrenia is less frequently associated with diabetes and some authors place the chief emphasis on the infrequency of diabetes with the asthenic body constitution. . . . Cases are reported by Reiter, Hofmann-Bang, Klieneberger, Scherer, and Katz. . . . Four of 5 cases reported by Masson were of the paranoid state, and by many psychiatrists would be regarded as schizophrenics." Of his own 5 cases referred to in this paper by Menninger, only 3 are briefly described. Of these, 2 are repetitions of cases described in the previous paper; the third was a female failing mentally for 10 years who developed paranoid delusions at 49½ and diabetes at 60. It was Reiter(1) who first indicated the rarity of this syndrome citing only casual case material. Hofmann-Bang(2) did report a case similar to ours, his being a young male who developed schizophrenia at 27 and diabetes at 38. But Klieneberger's case was that of a known diabetic of 12 years' duration who developed a carbuncle and a toxic psychosis at the age of 56. Scherer(7) reported a 20-year-old female who developed a catatonic picture following diabetic coma, and Katz recorded a similar picture with organic elements and confusion developing in a 24-year-old female who was known to have had diabetes for five years. Masson(3) gave brief reports on 4 cases, and cited another. In 2 of these, chronic alcoholism played a part in the development of the mental picture; one was a 37-year-old female with a history of fearfulness, apprehension and voices for three years, in whom glycosuria was discovered; the other was a 47-year-old female whose mental illness began at 41, characterized by threatening voices, uncomfortable sensations and finally hallucinations of persecution. His third case was a negro whose diagnosis in 1890 was chronic melancholia, in whom diabetes was discovered at 55. Autopsy later revealed general cerebral atrophy (which may have been his original diagnosis). His fourth case was that of

a female, 41, with ideas of reference, auditory, visual and tactile hallucinations, who developed glycosuria at the age of 57.

Over 30 years ago, Schultze and Knauer (9) as well as Bonhoeffer(10) laid down principles governing the nosological separation of psychoses occurring together with diabetes which should be valuable in understanding the character of the material we deal with here. Quoting observations of German and French authors, as well as his own to the effect that diabetes mellitus itself is rarely a direct cause of psychoses, Bonhoeffer(10) states that the picture is generally a circular (depressive) one, should begin after the diabetes, should rise and fall with the sugar and is usually a psychosis ascribable to the underlying neuropathy or arteriosclerosis. Schultze and Knauer(9) laid down criteria for diabetic psychoses: (1) The diabetes must come first. (2) There must be no other available causes for the psychosis. (3) The course of the diabetes and the psychosis must be parallel. (4) Treatment must cure not only the diabetes, but also the psychosis.

In the light of these logical principles, a careful analysis of the reported relevant case material reveals that only one definitive case (Hofmann-Bang) of schizophrenia associated with diabetes mellitus has previously been adequately described in the literature prior to our own observation.

COMMENT

The diagnosis of schizophrenia in this case would seem amply substantiated by the long years of textbook behavior and hospitalization together with the complete agreement in details of observation and diagnosis between the state hospital and our own ward on two widely separated admissions. Similarly, the diabetes mellitus was first discovered on the present admission by the presence of sugar in the urine and established beyond doubt by the usual procedures which ruled out atypical forms of sugar or glycosuria.

The observation of a rarity in clinical medicine is arresting in itself. Such a case should offer a basis for a rational, scientific explanation but, beyond pointing up the

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questions which it raises, we feel that detailed knowledge is lacking for the understanding of its significance outside of speculation.

Of special interest is the atypical character and course of the diabetes in our case. Reference to the treatment tables reveals the unpredictable response of the diabetes to treatment. This observation has previously been made by one of us (S. P.) in two cases of diabetes mellitus in severely schizoid boys who have been treated by Dr. E. Rawle Geyelin of New York City for over 10 years with indifferent success and who have barely avoided hospitalization because of their characteristically paranoid and heboid ideas. In conformity with the ideas elaborated by Reiter(1), it may well be that the psychosomatic constitution associated with diabetes mellitus favors not only the incidence of the circular psychoses, but also a physiological weakness controlled primarily by the organic or pancreatic disturbance. In the leptosomes, however, in whom the incidence of schizophrenia is greatest, there are evidences of marked central vaso-vegetative disturbances as displayed by such common observations as the hypersalivation, seborrhea, and also the changes noted in the catatonic state. Conceivably, in line with the idea propounded by Schilder(11), and the work of Houssay and others so excellently reviewed by Daniels(12), the diabetes developed in this case might not only have a central origin, but also might be influenced in its course by alterations in the vegetative centers. Thus we would be able to understand the rarity of the association of schizophrenia with diabetes as well as the atypical course which the diabetes follows.

SUMMARY

1. We have presented a detailed clinical report of a case of schizophrenia associated with a true diabetes mellitus.

2. Analysis of the literature and clinical experience reveals such a combination to be extremely rare, our case being but the second definitive one recorded.

3. We have commented briefly on the psychosomatic and constitutional significance of this clinical combination of diseases.

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PREFRONTAL LOBOTOMY

CONVALESCENT CARE AND AIDS TO REHABILITATION¹

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Prefrontal lobotomy produces a profound alteration in the whole personality of a psychotic or neurotic individual. Indeed, this procedure is employed only in cases in which the sufferer is so fixed in his warped personality that other treatments have little chance of bringing about a recovery. However, it has been impressed upon us again and again that the surgical therapy and surgical aftercare in the hospital for a period of two weeks does not mean that the patient is cured, even though he may be relieved of his inner distress. As the patient comes out of the fog of confusion, listlessness and inertia that follows prefrontal lobotomy, he presents an altered personality. It is not a healthy personality at first. The best one can say is that it is an immature personality. Fortunately, this immature (in some cases infantile) personality proceeds to develop with astounding rapidity, and richness and depth are added in the months and years to come. In the rather short period of six years that we have been able to follow some of our patients the improvement in social adaptation has continued for at least three years, and in some instances for five. Whether some of our old patients who are still in difficulties at the present time will recover altogether, to the satisfaction of their rather critical relatives, only time will tell. It seems desirable at the present time, however, to discuss the reconstruction of these personalities that have been so profoundly altered by surgery, and to point out to physicians who have such patients under their care the various steps in recovery that may be anticipated, and the various problems that the relatives will be called upon to meet.

Prefrontal lobotomy consists in the surgical division of the white matter of both frontal lobes. On the basis of 150 cases

operated upon up to the end of 1942, we believe that the most satisfactory results are obtained when the incisions lie close to the plane of the coronal suture, and are of sufficient depth to interrupt 80 per cent to 90 per cent of the fibers in this region. A series of studies(1) has shown that the results of operation are due to interruption of the pathways connecting the frontal pole with the thalamus. In order to understand the results of operation it seems necessary to set down what is known concerning the function of these two important portions of the brain in the formation of the human personality.

FUNCTIONS OF THE THALAMUS

The thalamus is a large nerve center situated almost in the geometrical center of the brain. It consists of a large number of nuclei to which come fibers relaying impulses from the sense organs all over the body, eyes, ears, nose, mouth, skin, joints, muscles, tendons and internal organs. The thalamus in turn sends fibers not only in the reverse direction, but also to the hypothalamus, which is concerned with the regulation of the functions of the viscera such as heart, stomach, arteries; and the appetites for food, water, sleep, sex and muscular activity. The thalamus thus acts as the central station for the unconscious regulation of bodily activities, receiving the incoming stimuli and sending out messages to the muscles and glands of the body. This is not all, however. The thalamus also sends large bundles of fibers to the cerebral cortex. These are mostly concerned with the conscious appreciation of sensations. A person whose cortex is damaged in the auditory center on the left side is able to hear but he cannot understand. If his sensory hand center is damaged he can feel with the opposite hand, but he cannot recognize the object that he is feeling—and so on. In

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the case of the frontal lobe, and more particularly the prefrontal regions, it is ideas rather than sensations that are elaborated, and special ideas at that, concerned with the self as a whole and with the future, as we shall see presently.

The thalamus is also the center for emotion. The concept, emotion, is a rather philosophic one, since nobody has ever seen one, although the various effects of emotion can be studied objectively, and everybody knows what it is to feel an emotion. In fact, the very word "feeling" is used to denote not merely sensation, but also emotion. The bond is inseparable. Two years ago, in an interesting panel discussion on the neurosurgical treatment of disordered mental states(2) one of the psychiatrists who was chosen to present the negative side repeatedly used the phrase, "I feel —; I feel —; I feel —" until in rebuttal he was accused of "thinking with his thalamus."

It is not known how the thalamus generates emotion, but it may be said that when the consciously perceived aspects of a sensation or situation are more or less in abeyance, the emotion rises more vividly to the surface. This is probably the reason for the vividness of emotion that is experienced during dreams. Since consciousness, awareness, or what you will, is reduced during sleep emotion comes into the picture with more than ordinary intensity.

FUNCTIONS OF THE FRONTAL LOBES

The frontal lobes have been termed the center for higher intellectual function, but this is a rather indefinite phrase and probably not even approaches the facts. Bianchi(3) attributed "social sense" to the frontal lobes, but this also does not meet the scientific desideratum of precision, although damage to the frontal lobes produces preeminent effects in the social life. It is hardly worth while to discuss all the theories of frontal lobe function that have arisen since his contributions beginning half a century ago, since it was not until prefrontal leucotomy was devised by Egas Moniz(4) that a satisfactory method was available for the study of precisely placed lesions in the frontal lobes in individuals whose personalities were deviated in certain directions.

Our own studies(5) have indicated that the frontal lobes are concerned with the elaboration of ideas concerning the self. Self-consciousness in the larger sense, bodily as well as social, would seem to be a function of the frontal lobes. Foresight is another, particularly as concerned with the individual himself. Concentration and contemplation, again as concerned with the self, the ability to bring together past experience from all the various fields, to knit it together into an understandable pattern, and to erect hypotheses that will be of value in the race for success—these also are apparently mediated by the frontal lobes. Whether other functions will also be determined in the future as additional cases are studied by more penetrating observations, only time will tell. We do not pretend to have exhausted the various categories. We would, however, emphasize the *personal* aspect of all these functions. A person with legal, scientific, mechanical or business training, may be quite capable of performing the various calculations, deductions and other mental operations that are concerned in his productive activities, but at the same time may exhibit gross defects in the realm of interpersonal relationships, and appear rather childish, immature. This is one of the outstanding peculiarities of an individual following prefrontal lobotomy. Finally the frontal lobes give to us the imagination to perceive what ought to be done. This is possibly the highest form of intellectual activity. It is as though the frontal lobes were the lens of a super-camera that brings together all the varied impressions from the past and projects an ideal image of consequences into the future, not in their static relationships, but in the matter of time-space relationships, social values, and even beyond that into the need for alterations of this or that condition in order to improve upon the situation as it exists at the present moment. "Seeing what ought to be done" combines imagination, ambition, self-consciousness and foresight, and possibly expresses in pragmatic terms what Bianchi meant when he spoke of social sense.

There are some reports in the literature(6) of partial excision of both frontal lobes. Such operations are done for tumors or other

lesions that are at least disabling and often threatening to life. Such operations are very mutilating to the personality, and no patient, so far as we know, has been able to function effectively in a social existence. Apparently the frontal lobes are essential in the successful adaptation to a life of useful activity. On the other hand, more than half of our patients are usefully occupied following prefrontal lobotomy. The difference, of course, resides in the fact that no brain tissue is removed during prefrontal lobotomy; it is just the main portion of the fibers that is severed. Study of the brains from patients who have succumbed later reveal the integrity of the cortex of the frontal lobes (although with some shrinkage) while the degeneration affects in quite a selective manner the nucleus of the thalamus that sends its fibers to the frontal regions. In other words it is the emotional component of the ideas elaborated in the frontal lobes that is specifically reduced. The emotions are lively and the intellectual functions are intact, but they remain separate and divorced as far as the patient himself is concerned. Consideration of these aspects of the problem will lead to a better understanding of the patient who has undergone prefrontal lobotomy for the relief of disabling mental symptoms.

THE PATIENT

The individual who is ideally suited to prefrontal lobotomy is one whose emotions are largely concerned with himself. This is the patient who fears heart disease or cancer or syphilis or contamination; who is a prey to ideas of guilt or of persecution, who broods excessively on the terrors of the unknown future and who cannot make up his mind between this and that; who gets so emotionally disturbed on coming in contact with others that he is unable to think clearly; who sees death as the only solution to his difficulties. More difficult to influence satisfactorily are those persons who have drifted away from the world of reality and who are constantly harassed by imaginary voices, visions, odors, and by fixed ideas that keep coming again and again. Nevertheless, as long as there is a certain minimum of emotion that attaches itself to the ideas, a good

result in terms of relief from distress can be anticipated. Only when the emotion dies out and the individual lapses completely into the dream world of psychosis with no struggle against the manifestations of disease is he to be considered too emotionally deteriorated to be aided by psychosurgery. As long as the battle keeps up and the ideas are still capable of causing distress to the patient, even if it is only manifested in the form of inattention, perplexity, unresponsiveness on the one hand, or mannerisms, combativeness and untidiness on the other, some measure of improvement may be possible, although complete restoration to vigorous constructive existence is unlikely. In the main, the time factor is of less importance than the degree of the break with reality, other things being equal. A patient with obsessive compulsive symptoms running on for decades has a better chance than a patient whose complete absorption in hallucinations is measured in as many months. Also an older person presents better possibilities of readjustment than a young person, because for half a century or more the older person has adjusted satisfactorily to the world, whereas the young person has probably started his peculiar warped behavior with adolescence or even before that.

POSTOPERATIVE CONDITION

There is a phase that patients pass through while still in the hospital following prefrontal lobotomy that deserves passing comment. This is characterized by more or less complete blankness and inertia, with no realization of the passage of time, with disorientation in space and often to person, with complete amnesia for the recent past. Patients usually go to the extent of denying that an operation has been performed although such patients may recall having the head shaved, the holes bored in the skull and so on just the day before, and although they wince when the operative site is lightly tapped, and although they can see and feel the bandages covering the wounds.

This apathy, indolence, inertia is often in striking contrast to the agitated restlessness that was such a prominent feature before operation. With it goes a certain blank-

ness of the facial expression, and monosyllabic replies with a sort of flattened plateau type of speech that is quite striking. Finally, such patients are reduced to the level of the infant in that they have to be fed, and they take no responsibility for control of the bowel or bladder.

Some patients are more active, playing in an aimless way with the light cord or the bandages, tearing up paper into small bits, rolling up an edge of the napkin, or stroking, tapping, rubbing, picking at themselves in a persistent way. We have found that a rag doll or a rubber dog will absorb attention by the hour, and will divert the patient's attention from his bandages. Sometimes a pencil and a piece of paper will be enough to start an endless letter that may start off satisfactorily but end up with the mechanical repetition of a certain phrase, line after line and even page after page.

A disconcerting type of activity sometimes appears immediately after operation, but more often after a week or ten days. This consists in loud talking, singing, beating on the trays, pulling the bell cord, wandering about the halls and engaging total strangers in hilarious conversation. A few patients slap the nurses or doctors, tear their clothes, urinate and defecate on the floor and otherwise become disturbing to the hospital routine. The operation in these cases seems to have taken off the brakes, as it were, and released the patient from the bonds of his social conscience. Too great cheerfulness immediately after operation is usually an indication that not enough fibers have been sectioned and that relapse into the former morbid state will occur. If it develops somewhat later the family is in for some trying times. Indeed, some patients who have been discharged while still in the state of relative inertia and indifference have later proceeded to "take the house apart" when they got home, and their destructive behavior has necessitated their return to a mental hospital. Milder cases can be cared for by the ingenuity of the family or of a nurse until this phase quiets down. The problem of readjustment to the home environment is possibly a bit more difficult in the case of overactive patients than it is for the inert ones. Not infrequently there

is alternation in behavior from sluggishness to unproductive restlessness, and impatience at efforts of control. It requires a steady hand to guide these patients to recovery.

THE PATIENT COMES HOME

When the patient is discharged from the hospital to the home environment the mutual readjustment of the patient and of the family is about to begin. During the hospital phase the patient has been cared for by the nurses, and the relatives have been present for only short periods, have observed the apathy give way to a greater interest in external happenings, and have not seen the efficient machinery whereby the patient was kept in presentable condition. To their observation the patient is convalescing nicely and it is only a matter of time before the hair grows back and everything is fine. We are in the habit of discussing rather fully with the family this matter of convalescence. Otherwise the family may be in for some surprises. If the family is forewarned they will not become alarmed at the patient's vagaries.

Usually the inertia is the first problem with which the family must contend. Whoever has charge of the patient will have to pull him out of bed, otherwise he may stay there all day, although there is no reason for him to do so. It is especially necessary for somebody to pull him out of bed since he won't get up voluntarily even to go to the toilet, and only alertness on the part of those who care for him will prevent a lot of linen going unnecessarily to the laundry. Once the patient has been guided safely to the toilet he may take an hour to complete his business. Often he has to be pulled up off the seat. "I'm doing it; I'm doing it" he says. "Just a little while; I'm nearly finished." Usually he finishes in a very little while, but the passage of time means nothing to him, and he stays on, not thinking, merely inert. If other members of the family are waiting for the use of the bathroom, this type of behavior can be exasperating.

It is well to take the key from the door, since some patients lock themselves in. The husband of one of our patients had to climb

through the transom to get his wife out of the tub eleven hours after she had locked herself in the bathroom. This was exceptional, the longest period for bathing usually being about three hours. Even after such ablutions it is not unusual to find "vast patches of unirrigated soil." The patient has stayed in the bathtub playing with the soap or rag, or merely absorbed in watching the water dripping from the hands and has not made a thorough job of bathing. The playfulness of some of the patients while they are in the water is still further trying to members of the family who are insufficiently foresighted as regards the wearing of old clothes. Patients are as little children and they enjoy squirting water around. One of our patients squirted so much water on the floor of the bathroom that the plaster on the ceiling below was loosened and both bathrooms had to be redecorated. If patients have had a washing mania before operation, this is especially apt to continue after operation, although the anguish with which the washing ritual was carried out is no longer in evidence.

It may be seen from these observations that patients are not to be trusted with bathroom privileges before they have regained some of their capacity to do a competent job and quit when finished.

Dressing and undressing are other tasks that require tact, encouragement, admonition, urging, scolding and sometimes assistance on the part of the family. The patient doesn't care what she puts on, any old rag will do, with no stockings and only slippers for going around the house. And the attempts at hair-do are bizarre to say the least. Yet the same patient is unquestionably appreciative of the efforts of helpers to put things to rights, and is childishly pleased with a good result. Cosmetics are apt to be sparingly used and sometimes inexpertly. Again the family must do the job, since it is all too easy for patients to slip into a certain routine of minimum care for decency's sake, and none for effect. Such patients are sometimes lacking in modesty and decency, and will carelessly present themselves to acquaintances and even strangers inadequately clad. And as they put on weight they will burst

the seams of their dresses and not take the trouble to sew them up.

Patients are variable in their reaction to new clothes. Some will take any old hand-me-down and wear it with complete satisfaction; others will spend far more money (when they have it) than they should, buying half a dozen hats at a time, even though they spend household money on their purchases. This is usually one of the problems to be faced later, however.

By the time the patient has left the hospital, inertia in the matter of eating is usually a thing of the past. The problem then is to keep the patient from eating too much. Two of our patients have gained over 100 lbs. in weight as the result of raiding the icebox or taking second and third helpings. It is only fair to say that in these cases, the preceding illness had caused the patients to lose upwards of 50 lbs. so that the return to the buxom state was probably within the limits of normal. Once the enormous gain is achieved, there is apt to be a moderate loss. Table manners are usually adequate, probably better than they were during the period of intense distress before operation. Nevertheless, reaching and snatching are sometimes observed.

Of great concern to some families is the lack of occupation manifested by patients once they come home from the hospital. The previously busy housewife who has always been a dirt-chaser, and who has kept her fingers perpetually busy with darning, crocheting, knitting and so on, sits with her hands in her lap "watching the snails whiz by." The family is unable to understand why this should be and is puzzled by the lack of industry. The situation is made more galling by the frequent salty or acid comments made by the patient, the critical attitude and the complaining of this, that and the other thing. Such behavior is to be met with vigorous methods, pulling the patient up out of the chair and giving her something specific to do. The nurse must be specific, since it is futile to tell the patient to tidy up the room. The patient has not yet regained the capacity to see what ought to be done. Like a child, she must be told to wipe the dishes, to dust the sideboard, to sweep off the porch; and when the patient

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sits down after completing somewhat less than half the assigned task, she must be set to work again after a suitable interval and in spite of her complaints of ill-treatment and in spite even of abuse. Whatever petulance there is in the complaints evaporates quickly. Attention may be switched to another task. Allowances must of course be made for the natural inertia, but it is well to get the patient back into the habit of doing things for herself, like making her bed, washing her own garments and so on.

Patients will sit at the window or listen to the radio by the hour if they are allowed to; patients who formerly were great readers of good literature will be interested only in the comic books or in the movie magazines. Men of considerable intellectual achievement will read avidly the sport page, and when discussion turns on the great events of the day will pass off some clichés as their own opinions.

Inertia is only one of the tribulations that families have to endure from some of the operated patients. That same lack of emotional appreciation of the future, the imagination to see what ought to be done, and the absence of self-consciousness lead to outspoken, tactless and childish undignified behavior at times. "Whatever pops into her head comes out of her mouth," was said of one patient. And another man described his wife as being "so full of don't-give-a-dam-ness." A very intelligent woman who reported her own reactions in some detail wrote: "I make decisions very rapidly; now that is not a poor thing to do, but I tend to state them to other people rather undiplomatically and I scare them out so that they fail to express any opinions of their own." Instead of being reserved, dignified people as they were before operation, they seem to take delight in calling attention to the foibles of their companions, and they sometimes bring mortification upon those of the family who are caring for them. Their attention is easily caught, they magnify little things, make poor jokes and laugh excessively. Fortunately the patients are usually on their good behavior in the presence of strangers, and give way to their childish exuberance only in the family surroundings. But it is not always thus. When we accused one of

our patients of bullying her husband, she retorted: "Why shouldn't I? I've always wanted to have my way, and I'll have it now. Of course I bully him." Fortunately he was an individual who could take an enormous amount of bullying with a smile.

Outspoken behavior on the part of a few patients leads to regret on the part of families that the operation was performed. This is unusual and seldom lasts, since the episodes of petulance are usually over before long. They are probably best handled by almost equally vociferous behavior on the part of the family. Patients lose their sensitiveness to criticism by virtue of prefrontal lobotomy, and they will accept with a smile the most insulting epithets; in fact, the more insulted they are, the better the patients seem to enjoy it. They appreciate the quickness of wit on the part of their opponent, and while unable to keep up with the fertility of imagination that is used by the interlocutor will do their best to keep up the vilification.

Patients take a childish delight in contests, will enjoy a chase or a slap, mock fist-clenching, tickling in the ribs and so on, and in this way it is often possible to get a patient past a period of mulish stubbornness. The puerile behavior distracts the patient from his previous objective of avoiding work or of tormenting the family, and a good round or two of physical contact will be followed by serenity and good-natured acceptance of a task. One cannot be serious with these people who are growing up from a surgically induced childhood. No amount of pleading, reasoning, tears or anger does any good. Their attention must be diverted from one line of behavior by a good-natured roughhouse, and then the process of re-education will go on. The adult members of the family enjoy a tremendous advantage over the convalescing individual if they remember that the patient is in an emotional childhood, and will treat the patient like an overgrown child. Better sense comes in due course.

Some patients, particularly those who have been sick for a long time, will carry over their ideas into the convalescent period. This is particularly true of those who had various phobias. The hand-washing mania has already been mentioned. Recently a lady whose

husband is a model of devotion, recited in a sort of litany: "My husband is no good; my husband deceives me; every night my husband is with other women; my husband wants to get rid of me; he took my boys away; my husband is no good —." Some patients still come to us months and years after operation and want to know why people don't stop talking about them. In the process of recovery after prefrontal lobotomy, the emotion connected with the ideas is radically cut off. The ideas remain but they no longer have the power to distress the patient. The ideas and in some cases the hallucinations and the phobias continue for a longer or shorter period. Since they have no power to harm the patient, they are relatively unimportant and tend to die out in the long run. Families are sometimes upset by hearing the patients give voice to the same ideas that were present at the time of the original breakdown, and think that the patients are suffering a relapse. Actually this is not the case. The ideas and the hallucinations are merely carried over from the psychosis. While they dominated the picture beforehand and prevented the patient from following out a normal existence, they have now lost that power. They continue of their own momentum, as it were, and since the emotion that kept them going has been cut off, they tend to die down. In almost all cases the patient's interest can be diverted from these ideas by some new activity. The period of gloomy intensity has passed, and the words come as in a litany.

As was indicated early in this paper, the intelligence is intact and the emotions are lively though shallow, and they are no longer attached to the image of the self. Patients laugh more and they flare up in anger. Occasionally they will cry in response to an external stimulus. Such was the case when a lady had to part with her superannuated canine pet who was being taken to the veterinarian to be chloroformed. For themselves and their own sometimes pitiable state they do not mourn. Some patients have taken serious beatings, financial, occupational, even physical, but have come up smiling. They seem to lack the capacity for continued contemplation of their distressful situations. Patients have even landed in

institutions because of too much freedom with the purse or bottle, yet they are hopeful and satisfied with themselves, expecting better luck next time. Regrets for the past are not encountered, and usually there is more or less complete forgetfulness not only for the hospitalization and operation, but even for a prolonged period previous to that. Some families fear to talk of the past, thinking that such conversation may bring up spectres that are better let alone. We have never found such to be the case. The patients accept their illnesses philosophically as something that had to be, and they are exceptionally grateful for the relief that has been achieved by operation. We get more Christmas cards from lobotomy patients than we do from all the rest put together. We suspect the family may have something to do with this, but we are nevertheless grateful in return for being remembered.

Special problems are occasionally encountered. Extravagance is one of them, and one not easily handled if a patient has just enough money to get along on. One shabby gentleman confessed that since operation the girls were costing him a great deal too much, and a lady had to be locked up because "I just couldn't say no to such a nice young man." The man had sold her some shares in a non-existent oil well. She had previously overdrawn her bank account for the purchase of an \$800 "oriental" rug and was an easy mark for any Atlantic City auctioneer. It would seem well to withhold the privilege of writing checks until some business sense has returned.

Alcoholism may become a problem after prefrontal lobotomy. We had hoped that the operation, by reducing the personality conflicts and emotional tensions in confirmed alcoholics might lead to the rehabilitation of some of them, but we were disappointed. Apparently the socially acceptable compulsion of bending the elbow is too deeply ingrained in these people to make its eradication possible. After operation it would seem that foresight, emotionally charged foresight, is insufficient to prevent some people from taking too much to drink. The results are all the more deplorable because of the lowered tolerance for alcohol in the lobotomized patient. Fortunately the problem is

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seldom encountered, but families should go to the utmost care to see that patients do not become too closely acquainted with the bottle. Complete abstinence is much the best.

Sexual activity usually shows relatively little alteration. Some patients report an increased enjoyment, like the shabby old codger who had lived in celibacy for thirty years. The freedom from conflict in some cases makes for renewed delight. In other instances, there is a dropping off in the emotional satisfaction with sex activity, sometimes leading to complete impotence or frigidity. One lady reported that she would no longer "go out of myself" emotionally at the sound of her husband's voice or even at the thought of him. Her sexual reactions were normal, however. Sometimes the wife has to put up with some exaggerated attention on the part of her husband, even at inconvenient times and under circumstances when she may be embarrassed. This sometimes becomes a ticklish situation. Patients may complain that their wives are no longer affectionate. This is easily understandable. A woman who has been the target of her husband's criticism all day long may well be excused for avoiding his embraces when his sexual enthusiasm is aroused, particularly since the sexual act is carried out without the former consideration and only for his own gratification. Refusal, however, has led to one savage beating that we know of, and to an additional separation or two. As a rule, however, both men and women take their sex activities more placidly than before and many partners make excellent adjustments. One of our patients got married after operation, and has borne two healthy children; and two men have become fathers. Spirited physical self-defense is probably the best strategy of the woman. Her husband may have regressed to the cave-man level, and she owes it to him to be responsive at the cave-woman level. It may not be agreeable at first, but she will soon find it exhilarating if unconventional.

A complication occurring in some 10 per cent of our cases is epileptic attacks. These may come on some months after operation, and in a few cases have persisted. They are apparently due to the injury to the brain at the time of operation, and it is not known

how they can be prevented. The smallest possible injury to the cortex of the brain is probably the best measure, since scars of the cortex are apparently the starting point of the electrical disturbance that eventuates in a fit. Medical measures lead to suppression of the attacks in most of the cases. Some patients have gone more than two years without attacks. The danger is still there, however, although reduced by the taking of medicines and avoidance of alcohol.

RETURN TO HEALTH

The period of adjustment to normal social conditions varies from case to case, not only as regards the type of individual, the duration and type of psychosis, age and other factors, but also as to the extent of the operation. As was noted earlier, some patients require two or even three operations to cut down upon the intensity of the emotion that is centered upon the self. When an extensive operation is performed the likelihood of an early adjustment to normality is remote. Some patients, indeed, never get beyond the stage of the household invalid. On the other hand, many patients are able to help about the house within a few weeks after their return home, and are able to take charge of the household within three months or so. The cultivation of industry in household matters by the person in charge is an effective stimulant. More and more responsibility is thrust upon the recovering patient, or may even be voluntarily assumed, and then the process of recovery is rapid. Some patients, particularly those beyond middle age have already yielded up the tasks of house-keeping to younger members of the family or to employees, and consequently can take their ease without hardship to members of the family. Indeed, the results of operation in such patients are particularly gratifying because of the serenity of disposition that accompanies the transformation from a state of perpetual anxiety and distress to one of calm acceptance of the inevitability of all things.

Return to gainful employment is possible with some people, not with others. Much depends upon the circumstances. If a patient has been successfully employed up to a short

time before his illness he will almost certainly be able to get back into harness in a relatively short time. Indeed, some young persons who had never been able to retain a job previous to operation are now regularly employed and are getting promoted. The time element varies with the person and also with the intricacy of the work. Highly technical work may not be possible for a year or so after operation, whereas a more routine or clerical job may be satisfactorily reentered within six weeks. Finding a new job is seldom possible before three months.

The return to employment is indicative of relatively complete recovery. As time has passed the inertia has disappeared, and bridling of the tongue has followed. The patient still has little quirks, mannerisms, or what you will, but he is able to get along with his employer or boss, and he does well enough at home to be trusted out of sight for the major portion of the day. As time goes on there is still further improvement in adaptation, with the assumption of greater responsibilities and a more effective attitude toward life.

Defects remain. There is no doubt that patients who have undergone prefrontal lobotomy are different from their former selves. Some remain somewhat indolent, lacking in the imaginative capacity to see for themselves what needs doing. Others are freed from the restraints imposed by timidity, sensitiveness or embarrassment and they can carry on quite undistracted by their inner thoughts. Some of them develop a tirelessness that is quite unexpected. Probably that same loss of the consciousness of the self that has so often been noted, makes them oblivious to the effect upon themselves of normal fatigue.

The second prominent defect that remains for a long period, and possibly permanently, is a certain abruptness, in manner

and speech, a certain buoyancy, an enthusiasm, an ingenuous personality, even an exuberance, that is at times rather trying on the close associates. It is kept under control fairly well most of the time, and particularly with strangers, and is manifested only among intimates. It is this quality that makes wives keep their fingers crossed, and husbands hold their breaths when going together in a social environment. A casual observer might note nothing unusual in the behavior of the individual, but the keen eye of the spouse is alert to detect some slip from dignity that is a reminder of former difficulties. Some families report that they can find absolutely no defect in the patient long after operation, but we suspect those families of more than ordinary charitable interpretations. Their patience and understanding have been well rewarded.

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AN EVALUATION OF TREATMENT FOR SENILE PSYCHOSIS WITH VITAMIN B COMPLEX¹

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INTRODUCTION

During the past two decades, the psychiatrist and the general practitioner have become increasingly aware of the problems presented by the aged(1). This has been especially true in many of the state hospitals for mental diseases throughout the country. For instance, a recent survey at the Worcester State Hospital(2) revealed that out of 2400 patients, 700 were over sixty years of age. This ratio holds true in the State Hospital for Mental Diseases at Howard, Rhode Island. The following statistics illustrate the problem.

During the fiscal year, July 1939 to July 1940, there were 137 new admissions to the senile group (70 males and 67 females), approximately one-fourth of the total hospital admissions. In addition to the new admissions, there were received on this service from other wards in the hospital 286 patients (135 males and 151 females). The total number of transfers, discharges and deaths on this service was 370, making an increase in the hospital population for this group of 53 for the year, necessitating more bed space and nursing care.

One of the striking features of most new admissions was the pronounced symptoms of avitaminosis, the most common of these being cheilosis, glossitis, reddish discolorations on the bony prominences of the body, secondary anemia, seborrheic lesions of the alae nasae and scalp, and muscle wasting of the extremities. In addition, many of these patients complained of loss of appetite and weight, vague neuritic pains of the extremities, and occasional diarrhea. Social service investigation revealed that in many instances patients had been living alone, subsisting on inadequate diets of bread and tea and soups of

questionable nutritive value. Many patients were edentulous and unable to masticate solid foods properly.

The evidence of vitamin deficiency and poor nutritional history led us to select a group of patients with the diagnosis of senile psychosis and give them known factors of the vitamin B complex; *i. e.*, thiamine hydrochloride, nicotinic acid, riboflavin, and pyridoxine. The other factors of the vitamin B complex which are not as yet well defined either from a physiological or chemical standpoint were omitted.

METHOD

In our studies 20 patients were used. Broken down in accordance with standard nomenclature(3), the diagnosis for both control and treatment groups can be seen in the table below.

SENILE PSYCHOSIS

	No. of patients	Confused delirious	Presbyophrenic	Simple deterioration	Depressed agitated	Paranoid
Control	10	3	0	4	1	2
Treatment ..	10	3	0	3	1	3

In selecting cases, we made specific conditions for both groups; namely, that the age range should be between 68 and 88 years, that patients had not been in the hospital longer than 15 months, that the average duration of the illness should not be more than 18 months prior to admission. Patients who had a history of injury, alcoholism, pernicious anemia, or who showed symptoms and signs of a structural nature (aphasia, hemiplegia, etc.) were ruled out. Female patients were used, since the building in which they were cared for was better equipped and had more graduate nursing personnel. Before and after termination of treatment,

¹ Read at the ninety-eighth annual meeting of The American Psychiatric Association, Boston, Massachusetts, May 18-26, 1942.

both groups were given psychometric, neurological and physical examinations as well as laboratory examinations, including gastric analysis, basal metabolic rates in patients who were cooperative, and fasting blood chemistry, including urea nitrogen and sugar. A routine red blood cell count, hemoglobin determination, white blood cell count and differential cell count were also done. Behavior records were made for both treatment and control groups. The following items were observed: appetite, eating habits, toilet habits, motor activity, sociability, appearance and weekly weights. Two separate records were kept, one by the supervisor of the senile group and the other by the physician giving the treatment.

The menu for both groups was the regular hospital diet, including the essential proteins, carbohydrates, fats, minerals and vitamins. This did not, however, insure that patients would receive the necessary food elements, for many were uncooperative, ate poorly and did not eat the diet given. Both groups were kept on the same ward, and in the middle of the treatment program it was felt that, since the treatment group was receiving a little more personal attention, it would be well to give the control patients placebo hypodermics in order that one group might receive no more attention than the other, and that whatever benefit or change eventually occurred would not be influenced by the attention factor.

Treatment was given for a two months' period from November 5, 1941, to January 5, 1942. The dosage of the vitamins selected was determined in accordance with the dosages recommended by authorities on the subject(4). For the first 13 days thiamine chloride 10 mg. per day subcutaneously was given; it was then increased to 30 mg. per day for the remainder of the treatment period. The other vitamins given were riboflavin, 4 mg. orally daily; nicotinic acid, 50 mg. orally daily; pyridoxine, 50 mg. twice weekly intravenously. This last vitamin was given for a period of three weeks to determine its effect if any either during or after treatment(5). György has stressed the similarity of seborrheic cutaneous lesions in man to deficiencies in rats caused by lack of pyridoxine and related factors.

OBSERVATIONS

As previously mentioned, behavior records were made separately by the physician administering treatment and by the supervisor of the senile service who had worked with elderly people for many years. The observations made by both were then compared and found to be in general agreement. In both groups, sleeping habits were not appreciably changed. This was also true as to mental content. In other respects there were marked differences between the treatment and control groups. The former became neater and more tidy, and took more interest in personal appearance. Those who had seemed most dilapidated were more alert. Two patients who had been markedly confused recognized members of their family for the first time since hospitalization. Another patient who had been extremely depressed became more cheerful and agreeable. One patient who was resistive became more cooperative. In general, patients became more sociable, showed an improvement in appetite and in their personal appearance.

The standards for selection in our series made it necessary to select patients who had been in the hospital for over a month or two, and, as a consequence there were no marked evidences of vitamin deficiency, with the exception of 2 cases. One, who was in good contact and had been complaining of cramp like pain in her lower extremities, stated these symptoms had improved with treatment. The other patient, who had a very scaly skin over the face and neck, recovered promptly with the treatment. A slight improvement was noted in the control group also. Five patients showed some improvement in appetite, 2 improved in their toilet habits, and one became less restless. It was felt that this might be due to the fact that these patients had received a little more personal attention than formerly.

Two months following the treatment period, 2 of our patients died, one from the control group and one from the treatment group. An autopsy performed on the former showed no evidence of arteriosclerosis.

It was also noted that there was a difference in weights. In the majority of cases those receiving treatment lost from one to

six pounds in weight. In only 3 cases was there a gain in weight; 2 patients gained one pound and another gained two pounds. In the control group, 5 gained from one to five pounds, 4 lost from three to four pounds, and one patient showed no change.

The alcohol test meal of 50 cc. of 7 per cent alcohol was used for gastric analysis. This was followed in some cases by a subcutaneous injection of $\frac{1}{2}$ cc. of histamine and another sample taken 20 minutes after injection. The giving of histamine is not without some element of risk, which made us conservative in its use. In the treatment group, 5 patients showed responses of free hydrochloric acid to the alcohol test meal and the histamine given one hour later. Three showed no responses to either histamine or alcohol, and 2 patients given only the alcohol test meal showed achlorhydria. In the control group there were responses of hydrochloric acid and 3 patients for both the alcohol test meal and the histamine; 3 others did not respond to the two tests; and the 4 remaining did not respond to the alcohol test meal.

Fasting blood sugars and urea nitrogen showed no perceptible changes either before or after treatment. A comparison of basal metabolic rates in the two groups is given because of significant differences.

BASAL METABOLIC RATES

TREATED GROUP

Case No.	Before	After
1	- 1.6	+14.4
2	Unable	-10.7
3	-24.4	- 4.4
4 (Patient restless)	- 9.0	+ 2.4
5	+ 6.9	Unable
6	Unable	Unable
7	Unable	Unable
8	-11.1	- 3.5
9	Unable	Unable
10	- 6.5	+11.8

CONTROL GROUP

(Cases 11, 13, 16, 19, and 20 were uncooperative)

12	- 2.3	Unable
14	-10.3	-10.3
15 (Patient restless)	+27.7	+27.7
17 (Patient restless)	- 8.5	+15.8
18	+ 4.4	+ 9.8

Although a few of the patients were uncooperative and restless, making a determination impossible in some cases, there is sufficient evidence to indicate an increase in the basal metabolic rate of the treatment group. In all patients of the treatment group on whom the test has been completed, that there is an appreciable increase in the basal metabolic rate, whereas only 2 of the 5 completed in the control group showed an increase. It is interesting, also, that the patients in the treatment group were more cooperative with this procedure.

There was little change noted in the hematology of the two groups. Three patients in the treatment group had a lowering of the hemoglobin, and one of these had also a drop in the red blood cell count on termination of treatment. In the control group, there was a lowering of the hemoglobin determination in 2 cases at the end of the period. The color indices varied from .74 to 1.0 for the treatment group, and from .77 to 1.04 for the control group. These figures remained constant for both groups before and after the treatment period. The white cell count and differential cell count showed no essential differences. There were noted moderate hypochromia, anisocytosis and occasionally a few macrocytes in both groups.

When nicotinic acid was first given, before the main meal reactions were observed in 6 of the 10 treated cases. Patients complained of a feeling of warmth and were found to have some flushing, particularly of the face, and in one case on the upper extremities extending to the middle of both arms. These reactions were prevented if nicotinic acid was administered following meals. The other factors of the group, riboflavin, thiamine and pyridoxine, produced no reactions of either an objective or subjective nature.

PSYCHOMETRIC FINDINGS

Because of the advanced age, general infirmity and mental condition of the subjects, the most difficult problem for the psychometric program was that of adequate cooperation to make the results of any test representative. Most of the subjects com-

plained of defective vision, many had impaired hearing, some suffered from a marked language handicap and 2 were so disturbed that no test results could be secured.

Cooperation varied, not only between subjects, but also in the same subject on different tests. Each subject, however, was interviewed a number of times by two examiners, and every effort made to secure complete results on as many subjects as

TABLE 1

A COMPARISON OF THE PERFORMANCE OF THE TWO GROUPS ON VARIOUS TESTS BEFORE AND AFTER THE TREATMENT PERIOD

	Before treatment period	After treatment period	Change
Wechsler-Bellevue Scale, Verbal I. Q.			
Experimental group ..	84	83	-1.0
Control group	74.7	73.7	-1.0
Wells Memory Test, Mem- ory Quotient			
Experimental group ..	43.4	46.4	+3.0
Control group	50	55.6	+5.6
Knox Cube Test, No. of lines passed			
Experimental group ..	3.25	2.25	-1.0
Control group	2.3	2.7	+0.4
Stanford-Binet (1916) Vo- cabulary test, No. of words passed			
Experimental group ..	22.9	22.1	-0.8
Control group	17.6	16.5	-1.1
Digits-Forward Test, No. digits correct			
Experimental group ..	6.0	5.7	-0.3
Control group	4.8	5.2	+0.4
Digits-Backward Test, No. digits correct			
Experimental group ..	4.1	3.7	-0.4
Control group	3.25	2.5	+0.75

possible. In general, the presentation of results is limited to those cases on which a reasonably valid score was secured both before and after treatment, so that the number of cases used to secure an average score varies somewhat for each test. Because of this restriction, and because the number of cases was too small for detailed statistical treatment of results, only average scores are presented.

Table 1 shows the results on the various tests for both the experimental and the con-

trol group before and after the treatment period. It indicates that there are not significant changes on any test with either group. The average scores made after treatment do not differ from those made before treatment by more than a single point, except on the Wells memory test, and, on this test, the score was approximately equal for both groups and also too small to be significant. Moreover, an examination of each individual's results showed that there were very few large variations in the scores of any individual. Since the few such cases found were distributed in both the experimental and the control groups, they can best be accounted for as the results of changes in the cooperation of these individuals rather than the results of the therapeutic program.

Because preliminary work showed that very few of these individuals could do the performance tests of the Wechsler Bellevue scale, principally because of their poor vision, only the verbal scale was administered in full. Table 1 shows more detailed analysis of the results on the subtests of the Wechsler Bellevue scale and the Wells memory test. It will be seen that there were no significant changes on any test. In no case do the results made by either group after the treatment period differ significantly from the results made by that same group before this period. An effort was also made to see whether there would be any changes in the "abstract-concrete" behavior of these subjects. For this purpose the block design test of the Wechsler-Bellevue scale, with extra designs are described by Kurt Goldstein, and the Weigl block test were administered to each one (6). Records were kept of their performances for qualitative evaluation. These results were also without significance. There were only a few subjects who did well on these tests, and there was little variation. Those who did well before the treatment program were the ones who did well afterward, regardless of whether they were members of the experimental group or the control group. The same thing was true for those who did poorly. The results do show that the experimental group was somewhat superior intellectually to the control group, for they scored higher on every test except the

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Wells memory test, and on this test both groups scored on the same low level.

In summary, there are no indications that the vitamin therapy program enabled this group of subjects to make any gains which could be shown by psychometric methods.

NEUROLOGICAL STUDIES

Neurological studies were made on both the control and treatment groups before and at the termination of treatment. For sake of brevity, only the positive findings are mentioned. Ankle jerks were absent in 7 patients of the control group and in 6 patients in the treatment group. Only one patient in the treatment group had absent knee jerks as compared to 3 in the control group. One of the treated patients had return of ankle jerks at the end of the treatment period. Muscle tenderness was present in 2 of the treated subjects. This disappeared with therapy. Three patients in the control group showed a mild degree of muscle tenderness of one or more extremities and this persisted at the end of the period of study. Sensory testing was attempted in a quantitative manner using a calibrated algesiometer registering from 0 to 80 grams pressure (7). Areas tested were almost identical, namely, the sole of the index finger, the mid-palm, the mid-sole of the great toe both the left and right extremities. Because it was necessary to rely on changes in the patient's facial expression as a gauge of pain perception the readings of the algesiometer were totally inconsistent and inconclusive. Cranial nerve changes and tremors were not influenced by treatment.

DISCUSSION

In determining results, the group was especially interested as to whether or not vitamin therapy would insure sufficient improvement to enable patients to leave the hospital. In the treatment group, 3 patients are now on family care and are making an adjustment in the community with some supervision; another patient will be able to return to her home, as soon as her family makes the necessary arrangements; one patient died of broncho-pneumonia; and the remaining 5

will require an indefinite period of hospitalization. In the control group, one left the hospital on trial visit and is making an adjustment with supervision in the community; one died of cardiac failure; and the remaining 8 will require an indefinite period of hospitalization. The following table summarizes briefly the results:

	Death	Release from hospital	Expected release	Indefinite hospital care
Control	1	1	0	8
Treatment	1	3	1	5

From our observations, it would appear that the administration of vitamin therapy in senile psychosis has materially changed the behavior pattern of the individual patient to such an extent that some have become better hospital citizens. Some have returned to the community.

We cannot, of course, say that patients released from the hospital will remain indefinitely in the community. However, the group felt generally that the prognosis for these cases was rather poor, and, if therapy had not been instituted, there would have been little likelihood of improvement to the point of supervised community adjustment.

Economic factors will have to be considered by those who contemplate using vitamin therapy in the aged. The cost of the vitamins for our problem was approximately \$300.00.

We realize that our series of cases is small and that the treatment is expensive. Therefore, we do not recommend its use routinely in senile psychosis, though it would seem that in those patients showing evidences of vitamin deficiency this form of therapy is justified. We have presented this paper as a preliminary report, and our studies indicate that beneficial changes do occur. We hope that this will stimulate further research and investigation of the rôle played by vitamins in the process of senility.

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A FOLLOW-UP STUDY OF ONE HUNDRED AND ELEVEN NONHOSPITALIZED DEPRESSED PATIENTS AFTER FOURTEEN YEARS¹

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AND

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Sir James Mackenzie(1) paid tribute to the follow-up method as a great factor of augmenting clinical experience.

In 1921, Bond(2) reported a follow-up study after five years on 111 female patients admitted to a mental hospital in 1914. This is a splendid report on human nature gone sufficiently astray from various causes to warrant hospitalization. His patients were of several reaction types, but among them were 41 manic-depressives who doubtless had something in common with our patients. In 1941, Hamilton and Wall(3) reported the follow-up study of 100 hospitalized psychoneurotic men after four to fourteen years, 23 of whom were regarded as reactive depressions.

Our study was undertaken in the belief that a group of nonhospitalized patients differed considerably from those hospitalized for similar disorders in public or private institutions. They are thought to characterize a sampling of the extramural practice of psychiatry—persons trying to get along without institutional help, in many instances never admitting that the disorder from which they were suffering was other than an obscure disorder of some organ of the body. A lapse of fourteen years in the lives of these patients offers opportunity to learn more about one of the most distressful symptoms that man can have, namely, depression.

Within a period of one year in 1926 and 1927 at the Mayo Clinic, one of us (L.H.Z.) saw in office consultation 111 patients whose chief symptom was depression, despondency, or low-spiritedness. These patients ranged in age between sixteen and seventy-seven years. Sixty-five of them were

men. Seventy-nine were married and living with husband or wife. Many occupations and several professions were represented; many of the patients were college graduates. On the whole they had been moderately successful in their life work, and were generally serious-minded, somewhat introverted and self-centered. Other descriptive material about them is to be found in a report published by one of us in 1939(4).

Inasmuch as the patients were scattered over ten states precluding personal re-examination in all but a few cases, letters were addressed to them in 1928 and again in 1940 or 1941 asking for details concerning their health and their ability to work. Replies were received from the patients or their relatives, and in some instances a further correspondence was carried on for supplementary details. Family physicians were often helpful in clarifying points. A few patients returned to the Mayo Clinic for re-examination at intervals and were studied directly. A few who did not respond to the follow-up letter sent in 1928 have been heard from or had been examined in intervening years. Without asking leading questions, it was hoped to learn what had happened to the disorder first observed in 1926 and 1927. The most significant results of the survey made in 1940 and 1941 are presented in Table I.

A comparative analysis of some of the known causes of death given in Table I is offered in Table II. These figures are based on the 84 patients from whom we received reports.

Despite discrepancies in age and sex, it appears to be true that the average annual death rate from all causes among these patients is higher than it is in the general population. Malzberg(5) has called attention to a death rate in New York state hospitals

¹ Read at the ninety-eighth annual meeting of The American Psychiatric Association, Boston, Massachusetts, May 18-21, 1942.

TABLE I

FOLLOW-UP DATA ON 111 NONHOSPITALIZED PATIENTS, FIRST SEEN IN 1926-27, WHOSE CHIEF SYMPTOM WAS DEPRESSION

	No response to follow-up	Response to follow-up	Dead	Worse	Condition same	Improved	Well
1940-41 or 14 yrs. later.	27	84	25*	10	14	5	30
* Causes of death:							
Suicide						7	
Cause not given						6	
Pneumonia						3	
Cancer						3	
Post-operative						3	
Heart failure						2	
Intracranial vascular accident						1	
Trauma						1	
Occupational status (1940-41):							
Working at regular work						21	
Working part time						19	
Not working (1 retired)						19	

emotions elevate the blood pressure and cause the arteries of the heart itself to go into spasm. A more obvious fact is that depressed patients are often very much slowed up and this factor may serve to spare the heart.

The chart which follows, shows the psychiatric disorders in the lives of the patients, to the time of death, or to varying dates between 1926-27 and the present. Twenty-seven made no response to the 1940-41 follow-up.

Each horizontal line has at the left the sex and age of the patient in 1926-27. In each such line (according to the legend) the psychiatric disorders are marked off graphically for each of the 111 patients at the time in life when they occurred. The disorders of the youngest patient are charted in the top

TABLE II

COMPARISON OF THE PROBABILITY OF ANNUAL DEATHS DUE TO SPECIFIED CAUSES IN 84 NONHOSPITALIZED DEPRESSED PATIENTS OVER A PERIOD OF 14 YEARS, WITH THOSE OF THE GENERAL POPULATION FOR 1940.*

	All causes of death	Suicide	Cancer, all forms	Pneumonia, all forms except influenza	Heart disease, all forms
General population (median age about 29 in 1940)	1076.4	14.3	120.2	54.9	292.5
84 patients (median age 42 in 1926-27)	2126.	595.	255.	255.	170.

* Per 100,000 per year.

among manic-depressives (which included the overactive, elated types with the depressions) which is several times greater than that among members of the general population of the same age and sex. His study makes it clear that patients of this kind are beset by influences which impair their chance of survival. Our patients have probably succumbed to pneumonia at a somewhat higher rate than have the members of the general population. Malzberg's data tend to corroborate this. The suicide rate among the patients, even when allowances are made for age and sex, is many times what it is in the general population. On the contrary, however, death from heart disease seems to have been less among these patients than it is in the population at large, unless some of the unexplained deaths were due to this cause. Malzberg on the other hand, found death from heart disease more common although his study included the overactive, elated patients. Theories would have it that

line. The others, according to age, are charted serially to the bottom where the eldest patient's psychiatric disabilities are presented in graphic form.

The chart records many facts worthy of discussion. In the last fourteen years of the period over which the study extended, there were no frank attacks of elation or overactivity unless one or two patients now in public institutions might be in a chronically overactive state. These fourteen years have given additional support to the contention that the diagnostic term, manic-depressive psychosis, probably deserves to be used in a limited sense. In any event, the so-called manic phase was little in evidence in the lives of these 111 patients. The longest time interval between recurring attacks of depression was thirty-one years. In contrast to this, there was one patient who became depressed regularly each winter from an early age up to the last report. Also, some patients had had several short attacks of

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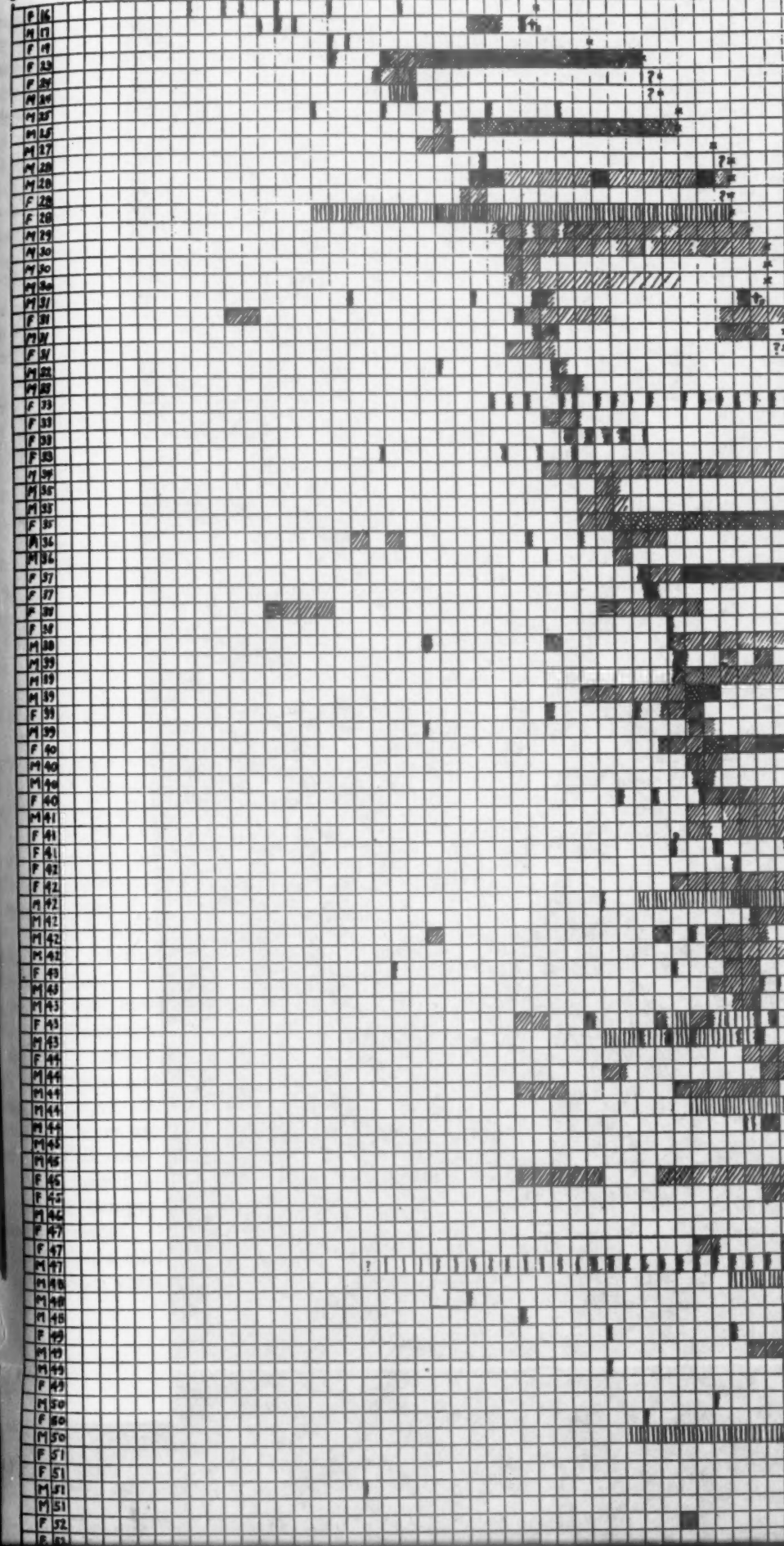
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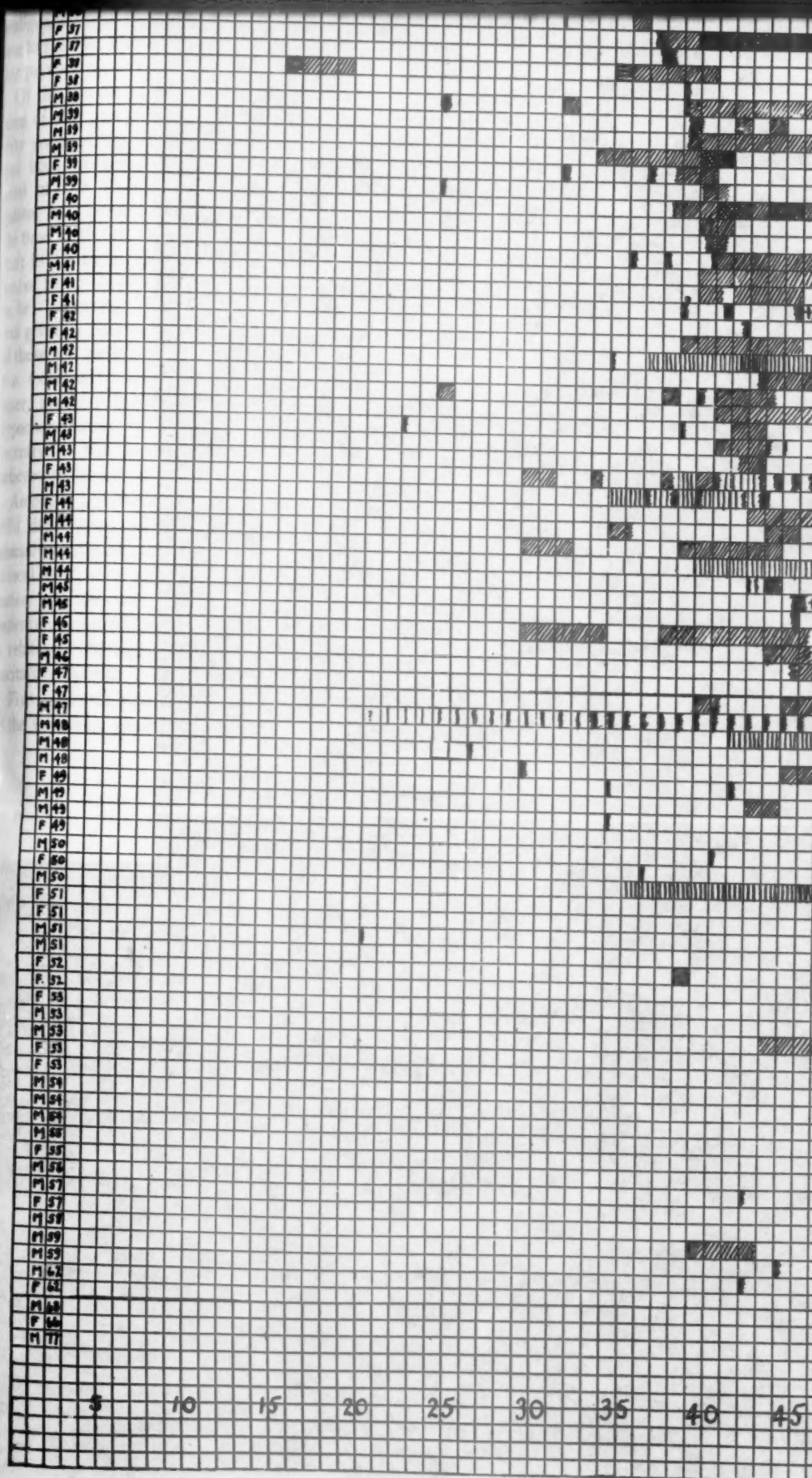
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depression every year for twenty years or longer. Twenty-five patients were known to have died; there may have been more. The cause of death was not given in six of the reported cases.

The follow-up data on the 84 patients heard from at this time may be divided into two classes: (1) forty-nine that died or did not improve, and (2) thirty-five that improved, or were recovered at the time of the last follow-up. The seven patients who died by suicide were all under fifty-eight years of age when death occurred. Five of these were originally diagnosed "recurring depression." Because another had financial and family worries from time to time, his condition was diagnosed a "reactive depression." One patient committed suicide in his first attack which was short and severe; he had become panicky and tensely anxious. Another patient who died soon after an operation had had a life-long fear of cancer. She induced a surgeon to operate and no malignancy was found. Her death, while not due to suicide, was intimately connected with her psychiatric disorder.

Of the ten patients who were worse at the time of the present inquiry, none was over fifty years of age in 1926-27. Five of them had been in public psychiatric institutions most of the fourteen years. Still another patient had been institutionalized a part of the time. Of the ten, six had been entering their first attack when first seen. The condition of three others was originally considered to be "recurring depression," and another was given a diagnosis of cyclothymia. Two of these ten patients at the original examination exhibited schizophrenic features; another, much retardation; and still another, hypochondriasis; the diagnosis applied most recently to the latter two patients is now believed to be catatonic schizophrenia.

Among 14 patients who did not improve, mild depression and neurotic (compulsive-obsessive-fatigue phenomena) or hypochondriacal attributes are often found in combination. With one exception, cyclothymic patients remained unchanged, tending to run a relatively benign, though at times incapacitating course.

Five patients made "some improvement" in the fourteen years, but are not well. Two

of these attributed their improvement to thyroidectomy. Religious influences were reported to be helpful in another.

Thirty patients reported that they were well, so far as depression is concerned. A goodly number of these had recovered from single attacks of mild depression and appeared to have had no more. Some had recurring attacks during the fourteen years, but were well at the time of this inquiry. One had become blind, but was not depressed. Another was disabled with arthritis. Most of these patients are functioning at work. The depression had not consumed their useful functions, as it had done in those patients who had not improved. From the data at hand, it now appears that the patients who had improved possessed some assets such as favorable energy output, training, congenial environment and cooperativeness which psychiatrists would do well to use as a pattern, to be induced, if possible among the more resistant and chronic forms of depression.

DISCUSSION

This would be a better follow-up study if the writers had been privileged to examine all surviving patients. However, from the information obtained, it appears that these patients who sought relief from depression as their chief symptom, were, on the whole, more profoundly disabled than they appeared to be when first seen. Textbooks perhaps paint the prognosis of the depressions somewhat more rosily than this study warrants. In retrospect, it appears that many of these patients sought treatment on the theory that there must have been a cause for the depression somewhere in the body. Adherence to such concepts with some rigidity often prevented adequate and appropriate treatment. Few have gone to psychiatric hospitals voluntarily. None is definitely known to have received shock therapy; for this reason, this follow-up study may serve as a sort of base line with which shock-treated depressions may be compared.

With relation to suicide, which still remains the clinician's most critical problem, it is worth noting two of the descriptive diagnostic groups, the recurrent and hypochondriacal depressions. Five of the seven pa-

tients who committed suicide may be said to fit into the classification of recurrent depression. This feature of recurrence is always indicative of a precarious state, in spite of apparent normality between episodes. It is likely that the repeated unfavorable comparisons, made by the individual himself of one of his variable moods with the supposedly normal condition, wears down his hope of eventual recovery to the point at which he attacks the situation with a certain solution—suicide. On the other hand, the condition of six of nine hypochondriacal patients remained unchanged, and that of the other three improved. That is to say, this group was free of suicides, even though the symptoms at first glance would seem to indicate the hopelessness of the condition. The chronicity of the hypochondriacal symptoms, however, may preclude the devastating comparison noted above—possibly these patients reap some advantages from poor health. At any rate, the constricting character of the patient's experience appears to render the total reaction relatively benign in terms of continuance of life.

There is little evidence in the study to indicate that the depressions occurring at the waning of the reproductive period in men or women are different from or more severe than those at other times in life. Although it is known that the later years of life are not so cheerful, and often take on a more somber tone, this study does not indicate more depressive attacks in the older age groups than among the younger groups.

There is indication that persons disposed to depression may have a lowered threshold for the establishment of conditioned reflexes. This is borne out by recurrences that invariably come at certain seasons, or under similar environmental circumstances. There is no additional evidence to support the theory, suggested in 1939(4), that patients are often from parents of widely diverse temperaments. Hobbs(6) has reported one of a pair of identical twins suffering from a depression and thus emphasizes the influence of an unfriendly environment on its genesis. Because the home environments of our patients were inaccessible to us, much may have been concealed that initiated and sustained the attacks of depression.

The most outstanding fact learned is that death is nearer to the depressed patient than it is to the average person of the same age in the general population. This survival defect is centered chiefly in the suicidal impulse which is concentrated particularly in depressed patients.

Errors of diagnosis, where the period of observation is short, would appear more likely when the attack is atypical, or is the first in the life of a young person. The early floundering of the emotions may be chiefly depressive, leading later to other serious disabilities in which this mood is incidental. From the evidence at hand, one may suspect that depression, by slowing the patient may even protect him to some extent from heart failure; this concept of one disease protecting the patient against another is known to have a basis of fact in clinical experience.

In the last fourteen years many of these patients had grown into the age group where retirement from the usual life work takes place. Forty, of the 59 known to be living, are able to do some work. Work may serve an important therapeutic purpose among these patients, some of whom are far from comfortable.

Depression, or low-spiritedness, has definite pathological significance in the lives of people and accordingly deserves no less study than neoplasms, infections and the effects of other damaging agents which we strive to cure or prevent.

SUMMARY

1. A fourteen-year follow-up on 111 non-hospitalized depressive patients brought information from 84, 25 of whom are dead, seven from suicide.
2. The suicide rate in this group is many times that of the general population of the same age and sex.
3. There appeared to be more deaths from pneumonia among this group and perhaps fewer deaths from heart failure than are to be found in the general population.
4. At least four patients formerly given a diagnosis of depression are now regarded as schizophrenic; six patients have been in

public institutions much of the fourteen-year period covered by this study.

5. Neurotic and hypochondriacal symptoms in combination with depression tend to accentuate the chronicity of the reaction.

6. Patients who recovered tended to have simpler disorders and some assets not usually found in those patients who were unimproved or worse.

7. None of these patients reported the use of shock therapy; this study may therefore serve as a basis of comparison with shock-treated patients.

8. Forty of 59 patients known to be alive are working in some degree.

9. Depression is a pathological state that deserves study as well as other damaging

agents, such as neoplasms and infections, to the end of cure or prevention.

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PROGNOSTIC FACTORS IN THE INVOLUTIONAL PSYCHOSES¹

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In the classification of mental disorders approved by The American Psychiatric Association the term "involutional psychoses" denotes a group including melancholia, paranoid types and other types. The group is a broad and obviously somewhat indeterminate one, and opinions as to the proper classification of individual cases have been various.

In the present study definite age limits constituted the main criterion in the selection of cases. Our procedure was as follows: First, all cases were listed which had been admitted to the Norwich State Hospital during the ten year period from January, 1930, to January, 1940, and which were formally diagnosed "involutional psychosis." There were in this group 105 cases, representing 1.3% of the total admissions. A working definition of involutional psychosis was then set up, namely: "a functional psychosis occurring for the first time in individuals between the ages of 40 and 60." The case material was then examined again, and it was found that 33 cases had to be excluded immediately as they did not fit the arbitrarily established definition. In some there had been previous episodes of mental illness, certain ones were too old or too young, and in others definite organic factors were mostly responsible for the psychosis. The relative frequency of involutional psychosis, therefore, dropped to 0.8% of the total admissions during that ten year period.

Of the 68 cases remaining, 17 (25%) died in the hospital during the period of investigation. Almost all of these patients were in an extremely undernourished state on admission and died soon afterward. Tuberculosis was a frequent finding. The average stay in the hospital of this latter group was less than six months, and this was not considered an adequate time in which to estimate the probable outcome of the psychosis, had it taken its natural course uncomplicated by the physical disorder. It was therefore considered advisable to eliminate these also from

the group to be studied. There remained, then, 51 patients who satisfied our established definition and could be observed for a long enough period in the hospital to make the data fairly valid.

II

A review of the literature revealed that little objective work has been done to determine the factors which might influence the prognosis of involutional psychoses. Most workers have been apparently more interested in investigating the *etiological* significance of pre-psychotic personality, psychic and organic traumata, marital status, sexual and other inter-personal relationships, the menopause, etc.² The results of these studies are frequently contradictory. Others have stressed *therapeutic* features, and probably every treatment known to psychiatry has been used including prolonged narcosis, metrazol with and without curare and spinal anesthesia, electric shock, insulin, testosterone and parathormone.³ Most work has been done with estrogenic hormone, but here too the results are not conclusive, ranging from zero per cent⁴ to almost 100% recovery or improvement.⁵

Of all the factors mentioned above, the personality make-up has been investigated most intensely from a prognostic point of view with emphasis also being placed on sexual compatibilities. Palmer³ states that in a group of 50 cases all those that failed to recover showed marked restriction in their mental horizon, and the majority showed obsessional characteristics. A general sexual inadequacy was noted in both men and

² Titley, W. B. Prepsychotic personality of patients with involutional melancholia. *Arch. Neurol. and Psychiat.*, 36: 19; July 1936.

³ Palmer, H. D., Hastings, D. W., and Sherman, S. H. Therapy in involutional melancholia. *Am. J. Psychiat.*, 97: 1086; March 1941.

⁴ Schrebe, P. G., et al. Involutional melancholia treatment with theelin. *Arch. Neurol. and Psychiat.*, 38: 505; Sept. 1937.

⁵ Werner, A. A., et al. Involutional melancholia. *Arch. Neurol. and Psychiat.*, 45: 944; June 1941.

¹ From the Norwich State Hospital, Norwich, Connecticut.

women of the group with bad prognoses. Davidoff⁶ found, however, that pre-psychotic personality was not materially related to the prognosis. Recently Malamud, Sands, and Malamud⁷ have emphasized the prognostic significance of age, intelligence, sexual and family adjustment, and personality traits.

The purpose of this study, therefore, was to correlate certain catamnestic and symptomatic factors with the known outcome in a group of patients with involutional psychosis and to discover whether certain of these factors or combinations of them are of prognostic value.

III

Of the 51 patients under study, 23 (45%) recovered or improved sufficiently to leave the hospital and make a satisfactory adjustment outside. These will be classified as the generally improved or *A* group.

There were 11 patients still in the hospital two years after the expiration of the period under consideration. Almost without exception these individuals had shown progressive deterioration, and now could not be distinguished from the usual class of deteriorated schizophrenics. Seventeen patients had left or had been transferred from the hospital unimproved or worse. These 28 patients (55%) are classified as the *unimproved* or *B* group.

Of the total cases, 42 were females and 9 were males. In the *A* group, 15 were females and 8 were males; in the *B* group were 27 females and 1 male. These findings suggest that men have a much better chance for recovery than women.

In group *A* 18 were married, 1 was widowed and 4 were single. In group *B* 18 were married, 4 were single and 6 were separated or divorced. The number of single individuals in both groups is higher than found in the average population of the same age. It may also be of some significance that only in group *B* were divorces and separa-

tions found. These facts suggest that pre-psychotic personality and inter-personal adjustments may be involved in the outcome of involutional psychoses.

The median age at onset of the psychosis was 52.6 years in group *A* and 51.8 years in group *B*. No prognostic significance could therefore be given to the age factor. This also held true for the time that elapsed between onset of psychosis and hospitalization. In both groups the median time was the same, namely, 6 months.

Psychosis in the family was found in a relatively high percentage of both groups, showing no great preponderance in either one. Family histories were positive in 10 group *A* cases (43%) and in 13 group *B* cases (46%). It is obviously significant that the psychoses in other members of the family generally occurred relatively late in life and many no doubt could be classified with the involutional group. Doty⁸ in a recent paper also called attention to this interesting fact.

The relationship of onset of psychosis to the menopause and cessation of menses was investigated. Of the 51 patients, only 2 could be considered as going through the menopause at the onset of their mental symptoms. In group *A* the menopause had occurred an average of 4.5 years earlier and in group *B* 5.9 years earlier. In one case the climacterium had occurred 18 years and in another 17 years before the first mental symptom appeared. These facts indicate that endocrine regressions that accompany the cessation of menses do not stand in direct relationship to involutional psychosis. The results show that the prognosis is better if onset of symptoms is closer to the menopause.

The hospital records for the most part did not offer satisfactory material from which elaborate personality studies could be made. From the pre-psychotic behavior patterns it was possible, however, to separate the patients into two groups: the more outgoing, active and social group, the so-called "extraverted" personality, and a more withdrawing, sensitive or "introverted" group. Of the improved patients, 16 (70%) were intro-

⁶ Davidoff, E., and Brew, M. F. The involutional psychoses. *Psychiat. Quart.*, 14: 412; April 1940.

⁷ Malamud, W., Sands, S. L., and Malamud, I. Involutional psychoses: socio-psychiatric study. *Psychosomatic Med.*, 3: 410; Oct. 1941.

⁸ Doty, E. J. A study of manic-depressive psychosis occurring during the later life period. *Am. J. Psychiat.*, 98: 645; March 1942.

verted and 7 (30%) were extraverted. In the unimproved group, 11 (39%) were introverted and 17 (61%) were extraverted. It would appear, therefore, from these findings that the introverted individual has a much better prognosis than the extraverted one.

It was not the practice of the hospital during the period under consideration to offer more than a conservative form of treatment for patients with involutional psychoses. Only 2 cases of group *A* and 6 cases of group *B* received any "specific" therapy in the form of estrogenic hormone. The figures do not indicate that the course of the disease was in any way influenced by the substitution therapy. It also cannot be disputed that of the group of 23 improved patients, 21 got well without any specific form of treatment, and that 6 patients of the unimproved group were not helped in spite of intensive hormone therapy.

The predominance of depression in group *A* coincided with a relative increase in the number of suicidal threats and attempts, as contrasted with group *B*. See Table II.

The necessity for protecting patients with involutional psychosis against their own self-destructive tendencies is all the more imperative in view of the fact that the prognosis in such individuals is more favorable.

Hallucinations, both auditory and visual, appeared in both groups but showed a great preponderance in the *B* group. In group *A* the auditory hallucinations were almost entirely condemnatory; the visual ones centered about religious themes, were much more fleeting than in group *B*, and were always associated with condemnatory auditory experiences. All but a few patients visualized God exclusively. See Table III.

Those symptoms usually associated with schizophrenia, such as ideas of persecution, systematized delusional trends of a paranoid

TABLE I

Group	No. of cases	Agitation	Depression	Self-accusation	Self-depreciation	Somatic delusions
A	23	19 (83%)	21 (91%)	18 (78%)	14 (61%)	18 (71%)
B	28	8 (28%)	7 (24%)	5 (17%)	4 (14%)	8 (28%)

IV

In analysing the case material from a symptomatic viewpoint, it became strikingly evident that in the improved patients the symptom picture was predominantly depressive in character. The frequency of depressive symptoms found in both groups is shown in Table I.

Features normally associated with a depressive psychosis predominated in 78% of those that improved, but were present in only 21.5% of the unimproved group. Agitation and a constant depressive mood were the most prominent symptoms, followed closely by self-accusatory ideas and somatic delusions. It was noteworthy that in group *A* the somatic trends were very bizarre in character (*e.g.*, "stomach blocked," "incurable disease," "eyes falling out," "head swollen"); in group *B* the complaints were milder and more of a hypochondriacal nature (*e.g.*, "head heavy," "something wrong," "generalized pains").

TABLE II

Group	No. of cases	Suicidal threats	Suicidal attempts
A	23	13 (57%)	10 (43%)
B	28	4 (14%)	7 (24%)

TABLE III

Group	No. of cases	Auditory hallucinations	Visual hallucinations
A	23	9 (39%)	5 (22%)
B	28	19 (68%)	12 (43%)

TABLE IV

Group	No. of cases	Ideas of persecution	Systematized delusions	Catatonic features
A	23	2 (9%)	4 (17%)	4 (17%)
B	28	21 (75%)	22 (79%)	18 (64%)

nature, and catatonic features, were then analyzed in relation to the known outcome. The results are indicated in Table IV. The predominance of schizophrenic-like symptoms in group *B* and their relative infrequency in group *A* is readily observed. It must be assumed, therefore, that such symptoms appearing in a person diagnosed as

having an involutional psychosis will usually result in a bad outcome.

When the case material is regrouped according to the predominating symptom picture, whether depressive or schizophrenic, one finds that of the 23 patients who got well, 19 (83%) were of a depressive and 4 (17%) of a schizophrenic stamp. Of the 28 that did not recover, only 4 (14%) were depressive while 24 (86%) presented schizophrenic pictures.

Another interesting observation was made during the study of this case material. The mental picture at the end of the period of study in the 4 unimproved depressive cases was characterized by a chronically neurasthenic state, lacking those elements usually associated with deteriorating processes. Of the 24 cases in the unimproved schizophrenic group, each patient showed profound deteriorating trends; the final mental status was characterized by such expressions as: "simply vegetating," "mute and tube fed," "profane," "resistive," "disrobing habit," and "posturizing."

It is evident that the prognosis of the cases studied is closely related to the content and symptomatology of the psychoses. Those with depressions more often than not show complete remissions, while the ultimate future for the patient with schizophrenic-like inclusions remains very dark. The question, therefore, presents itself: Could not involutional psychosis be more properly diagnosed as either manic-depressive psychosis or as a schizophrenia occurring late in life?

The statistics from this investigation certainly lead to such a conclusion.

SUMMARY

1. During the period January 1930 to January 1940, 68 cases of involutional psychoses were admitted to the Norwich State Hospital, representing 0.8% of the total admissions. 17 died within 6 months, leaving 51 cases for the present study.

2. Twenty-three (45%) had left the hospital as recovered or improved at the expiration of this period. Twenty-eight (55%) were unimproved or worse.

3. The prognostic significance of sex, marital status, time of onset and elapsed period before hospitalization, positive family history, relationship to menopause, effect of treatment, and prepsychotic personality was investigated.

4. Depressive features, such as agitation, sadness, self-accusatory and self-depreciative ideas, somatic delusions, suicidal threats and attempts, predominated in 78% of those that got well.

5. Schizophrenic symptoms, such as auditory and visual hallucinations, ideas of persecution, systematized delusions and catatonic behavior, were associated with an unfavorable outcome.

6. An analysis of the development and eventual outcome of the case material suggests the conclusion that involutional psychosis might more properly be diagnosed either manic-depressive psychosis or schizophrenia which has occurred late in life.

ON THE ETIOLOGY AND THE PREVENTION OF MONGOLISM¹

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AND

RUTH A. PROUTY, M.A.⁴

In a series of publications one of us (Cl. B.) has collected evidence that mongolism is the result of a particular growth deficiency during the prenatal period. The character of the deficiency suggests the lack of some hormones which are essential for the development of the fetus. In its post-natal development, the mongoloid child suffers from a complex endocrine deficiency in which the action of gonadotropic, thyrotropic and chondrotropic hormones is inadequate.

No attempt has been made in previous papers to dwell upon the etiology of the deficiency, because it was felt that one should first determine the character of the deficiency before one might venture to establish the cause. In the present study, observations on 250 cases of mongolism have been analyzed to present certain data on the etiology of this condition.

It is beyond the province of this paper to deal with the extensive literature. The three main etiological possibilities which need discussion are: (1) hereditary factors, (2) damage to the germ plasm (either paternal or maternal), and (3) a noxious factor within the mother during gestation.

No investigator has so far been able to collect evidence that mongolism is due to a hereditary degeneration. On the contrary, hereditary factors seem of little importance: mongolism is to be found in all social strata; it is spread over the population without correlation with the intellectual status of

the other members of the family. Of course, feeble-mindedness in a family is not protection against a mongoloid child. A few authors succeeded, therefore, in finding mental deficiency in other family members. We have in our material several cases of familial feeble-mindedness where older siblings of our mongoloid patient were on a moron level; our patient, the last child, turned out to be a mongoloid imbecile. The point of importance is, that heredity may explain the feeble-mindedness of the offspring, but the typical growth disorder of mongolism cannot be explained through the hereditary background. One factor which, strangely enough, has never been mentioned, adds confirmation to the unimportance of heredity. According to Mendelian expectation, the incidence of any hereditary condition should increase in proportion to the number of offspring. Although many a mongoloid child has 10 to 13 siblings, in no family with such a large offspring has multiple incidence of mongolism been found. Out of 255 cases, the only 2 incidences of multiple mongolism occurred in a family where all 3 children were mongoloid, and in another family where 2 of 3 children were abnormal. It is obvious that these two families do not prove inheritance, while the other 253 families with an offspring of 1 to 15 children clearly demonstrate the absence of hereditary factors.

The second theory above mentioned is based on the hypothesis that mongolism is not due to hereditary degeneration but is caused by some damage to the germ plasm, either from the maternal or the paternal side. The assumption is that one unfortunate gametic combination may have occurred which gives rise to that anomaly (mutation theory). This theory is mainly based on calculations drawn from a study of twins of which both or one had been found to be a mongoloid.

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There are now a few more than 70 instances of mongoloid twins in the literature. In 18 instances both twins were affected with mongolism. In the remaining cases only one twin was a mongoloid while the other was considered normal. Until recently it was believed that every case with 2 mongoloid twins was that of identical twins and no cases were known where non-identical twins were affected, but careful study of mongoloid twins has shown that at least 5 instances are known where non-identical twins have been affected with mongolism (Jervis). A scrutiny of the 13 cases which were considered to be identical twins shows that only 5 cases are beyond criticism and in the remaining cases it is by no means sure that they were identical.

It is almost certain that in only half of the 18 cases of mongoloid twins were the twins identical, and that in 6 to 9 instances, 2 non-identical twins were affected with mongolism. That means that in almost 10 per cent of non-identical twinning, both twins were mongoloids, while in the remaining cases only one showed that anomaly.

It is beyond the limits of this paper to discuss the significance of that observation in full detail. It is sufficient to say that the data at hand are not suitable to form a theory either of germinal blight or environmental importance because they may be interpreted in either way. The cases with one mongoloid in a twin pair seem to suggest, to some authors, a plasmatic disorder because "if the condition of the mother during pregnancy were the essential cause of the disorder, we should find it difficult to explain those cases where we find mongolism in one of twins" (Halbersma). This statement, however, does not hold. There is evidence that the environmental ("peristatic") factors in non-identical twins differ to a great extent, due to differences in placental circulation and other dynamic factors. Therefore, an unfavorable position is frequently the cause of a malformation or a disease in one of twins. Infantile cerebral paralysis, hydrocephalus, microcephalus, cretinism and even congenital syphilis have been reported in one of twins.

There is still another fact which has not yet attracted attention. Non-identical twins

are usually considered to be due to the occurrence of two ova in one follicle or to the fertilization of two separate ova at the same time. There is, however, a third possibility, that of a super-imposed pregnancy. In man and animal, who carry one embryo only, some unknown mechanism comes into play to prevent the fertilization of a second ovum. It is conceivable that in those cases where one twin is a mongoloid and the other one is normal, a deficient defense mechanism against a second pregnancy permitted the fertilization of a second ovum. Without going into more details, we wish to point out that twin research, in spite of its great interest, is not suitable to shed light upon the complicated etiology of mongolism. All conclusions so far offered by previous investigators are based more on mathematics than on observations; they neglect some essential medical factors and are based upon too small a material.

The third possibility for the occurrence of mongolism is a pathologic condition of the mother. The question is whether it can be proved that the condition of the mother and not a gametic disorder is at fault. We believe that the method of analysis which we adopted will bring definite evidence toward the solution. A series of investigations culminated in 1928 in a study by Adrien Bleyer. The analysis was based on the material of 2,822 cases and rendered evidence that the age of the mother plays a rôle in mongolism. The average age of the mother at the time of the birth of a mongoloid child was found more than ten years higher than the average maternal age at the time of birth of two million children who were born in the United States in 1934. More than 50 per cent of mothers were beyond the age of 35 when their mongoloid child was born. Graph 1 shows the age of 255 mothers of mongoloid children of the Wrentham material. This graph confirms earlier observations that many mongoloid children are born to mothers beyond the age of 35. Instead of comparing the material with normal children, we made a comparison with the ages of mothers at birth of mentally defective children of another type. These cases had been diagnosed as familial, or germ-plasm defect. The differences between the

two groups are striking. Most of the mothers of familial mentally defective children were below the age of 30 and only 3 per cent were over 40 years. In the mongoloid group 27 per cent of mothers are over 40 years.

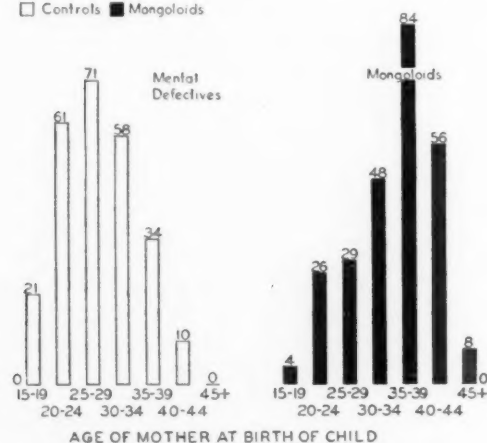
Age, however, cannot be the only factor in producing mongolism, because 107 of the 255 mothers in this group were under 35 years of age. Thus, about 41 per cent of mothers are in an age group (under 35) which is favorable for childbearing. Although a maternal age of over 35 years may favor the occurrence of a mongoloid child, it is clear that the factors which produce

logic condition of the mother were the cause of a defect, we would expect a difference between the number of siblings born before and the number born after the affected child.

From the statistical point of view, it is obvious that a study of an unbiased sample of families in which all children are analyzed might be expected to show that as many children will be born before the individual with a given characteristic as will be born after the affected individual.

Age of Mother at Birth of Child, 255 Mothers of Mongoloids Compared With 255 Mothers of Control Mental Defectives; Numbers.

□ Controls ■ Mongoloids



GRAPH 1.

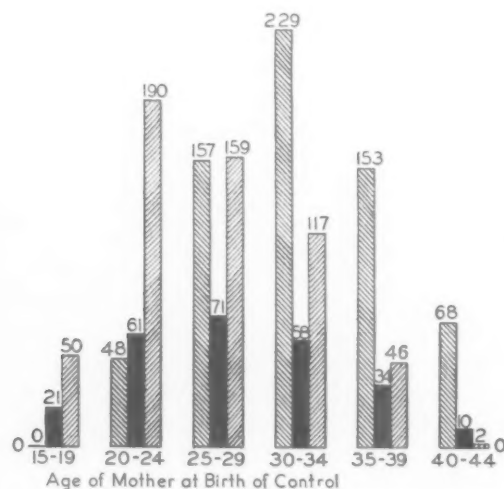
mongolism are not invariably linked with age.

Whether the condition of the mother or a gametic factor is responsible for mongolism may be answered by a study of the birth order of the mongoloid child.

The birth of a mentally defective child in which the defect is due to germinal deficiency, may be expected to occur at any place in the line of siblings. It is well known that defectives of the familial type occur as first children, in the middle of the family, or as last children. Apparently the birth of the mental defective has no influence upon the ability of the mother to have more children. Here we are dealing with a problem of genetics and expect no disturbance of the birth order. On the other hand, if a patho-

Siblings Born Before and After Control Mental Defective by Age of Mother: Numbers.

▨ Born Before Control
■ Control Mental Defective
▩ Born After Control



GRAPH 2.

In some families, the affected sibling may be born first, in other families last. However, these differences will cancel each other in the long run, and the findings will show a balance of siblings born before and after the affected child.

As one of us (N. D.) has shown previously in a study of birth order in 4,316 mentally defective children of all types, there is no evidence that the mentally defective child tends to be born in the first or in the last position of the family. Taken as a whole, the trait of a mental deficiency occurs with almost equal frequency at any place in the birth order. The material confined

to the birth order of the first 9 children is presented in Table 1.

Table 2 shows the number of siblings born before and after the mentally deficient child by size of family. We note that 8,999 children, or 39.2 per cent were born before the mentally defective child and 9,588 or 41.8 per cent, afterwards. This is very close to

patient. This represents a variation which is well within the expected variation and offers again, proof of the theoretical assumption.

Graph 3 represents the situation in mongoloid families by age of mother. Since the number of cases is identical in Graphs 2 and 3, immediate comparison is possible. The

TABLE 1

ORDER OF BIRTH IN 4,316 MENTALLY DEFECTIVE PUBLIC SCHOOL CHILDREN

Analysis Confined to Families with One to Nine Children ever Born
(Dayton)

Order of birth of ment. def. child	Size of family									Total
	1	2	3	4	5	6	7	8	9	
1	209	193	190	156	149	119	77	40	16	1,149
2	175	146	141	154	123	85	56	38	918
3	133	144	137	107	88	72	44	725
4	117	109	93	91	76	61	547
5	98	80	84	67	52	381
6	96	82	68	43	289
7	70	56	44	170
8	58	37	95
9	42	42
Total	209	368	469	558	647	618	577	493	377	4,316

TABLE 2

SIBLINGS BORN BEFORE AND SUBSEQUENT TO BIRTH OF MENTALLY DEFECTIVE CHILD, BY SIZE OF FAMILY

Size of family	Total siblings born	Siblings born before patient	Patient affected	Siblings born after patient
1	209	0	209	0
2	736	175	368	193
3	1,407	412	469	526
4	2,232	780	558	894
5	3,235	1,147	647	1,441
6	3,708	1,416	618	1,674
7	4,039	1,700	577	1,762
8	3,944	1,778	493	1,673
9	3,393	1,591	377	1,425
Total	22,903	8,999	4,316	9,588
Per cent ...	100.	39.2	18.8	41.8

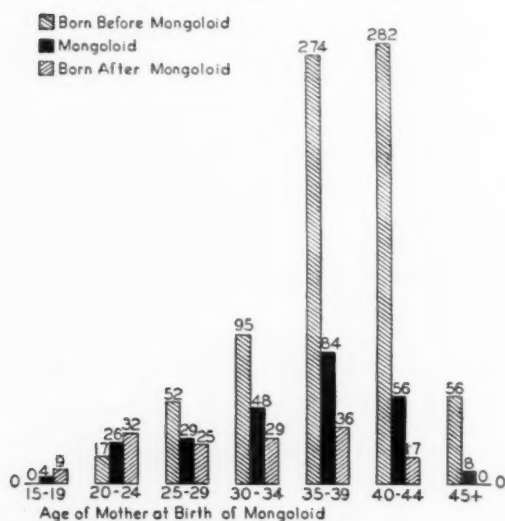
the expectation. Mental defect as a characteristic does not appear to be associated with any particular disturbance of the birth order.

In order to provide further material for direct comparison, we studied the order of birth of 255 feeble-minded children in the Wrentham State School. All had been diagnosed as familial mental defect. Counting the whole number of siblings of the defective child, 54 per cent were born previously and 46 per cent were born subsequently to the

first column shows the mongoloid as the first child of young mothers, aged 15 to 19 years. The striking item in this age group is the small number of siblings who were born afterwards. Only 9 children were born after the mongoloid as compared with 50 siblings born after the mental defective (control material). In the age group, 20-24 years, the number of children born afterwards is larger than that of siblings born before, but only a total of 32 children is born from 26

mothers in that age group. In the age group 25-29 years the reversal of the birth order is already present, while the control group shows the theoretical balance between those born before and afterwards. In the mongoloid group, the 29 mothers aged 25-29 years had only 25 children afterwards or less than half of the number born before (52). Most striking is the unexpected drop of children born afterwards in mothers aged 30-34 years where only 29 children appear as compared with 117 born afterward in the control group.

Siblings Born Before and After Mongoloid Birth by Age of Mother: Numbers.



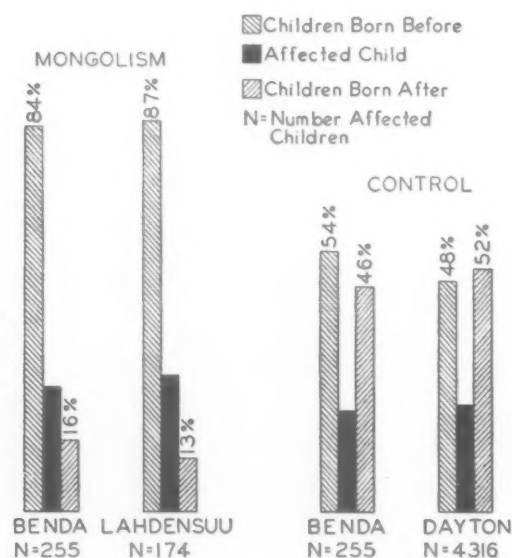
GRAPH 3.

One point is worthwhile noticing. In families with a mongoloid child, the number of normal previously born siblings from mothers between the ages of 30 and 34 is very small, while in the age groups of 35 to 39 and 40 to 44, the number of normal siblings is much larger than in the controls. This seems to indicate that in families with a mongoloid child at the end of the child-bearing period, the age of the mother at the time when their normal children were born was higher than in other families. In other words, these mothers have started child-bearing at a higher age than the control group.

In comparing the number of siblings born before and after a mongoloid child, the striking result is found that 84 per cent of

the total number of brothers and sisters (100 per cent) is born before the mongoloid child and only 16 per cent is born afterwards. If the number of siblings born before and afterwards is calculated according to expectancy, the result is the following: There was a total number of 1,179 children. Two hundred fifty-five of them were mongoloids. Therefore, we might expect to have one-half of the difference between 1,179 and 255, or 462 as the figure representing the

Percentages of Siblings Born Before and After Affected Child in Mongolism and in Mental Deficiency Control.



GRAPH 4.

children born *before* the mongoloids and the other half, or 462 children, born afterwards. Instead, we find that 776 children were born before the mongoloid and 148 afterwards. The figures are outlined in Table 3 and Graph 4. We have 12.5 per cent of siblings born after the mongoloid when we might expect 39.2 per cent. Thus, more than three times as many children are expected after a mongoloid as actually are born.

The total number of siblings born in 255 families with mongoloid children is 924 which is only slightly less than the control group with 1,219. In the mongoloid group, the total number of children born before the defective child is 776, while in the control group 655 children were born before. In

other words, mothers who later gave birth to a mongoloid child had a period in their lives when they had children at, or even above, the average rate for all mothers. Then something happened: as the result a mongoloid was born and from that point on, these mothers produce at a rate which is much below the average. The imbalance between the number of children born before and afterwards suggests that the birth of a mongoloid child indicates the development of a pathologic condition of the mother which bears a definite relationship to the ability of the mother to have children. The decrease in fecundity of the mother after a mogo-

children appear on any place of birth order, the mongoloid child never occurred amongst the first children in those families who had 6 to 15 siblings. The larger the family, the more definite the trend toward the end of the birth line. Not in every case is the mongoloid child exactly the last child, but in those families with more than 5 children, the mongoloid is almost always among the last 3 children. We recorded in our list all pregnancies resulting in a living child. It may be mentioned that a study of the siblings revealed that in a rather large number of cases, the siblings born after a mongoloid have died shortly after birth. Many more

TABLE 3

SIBLINGS OCCURRING BEFORE AND AFTER THE MONGOLOID BIRTH

<i>Benda</i>	Mongoloids	Siblings born before mongoloid	Siblings born after mongoloid	Total
Expected	255 (21.6%)	462 (39.1%)	462 (39.1%)	1,179 100%
Observed	255 (21.6%)	776 (65.8%)	148 (12.5%)	1,179 100%
<i>Lahdensuu</i>				
Expected	174 (23.9%)	276 (38.0%)	276 (38.0%)	726 100%
Observed	174 (23.9%)	480 (66.1%)	72 (9.9%)	726 100%

TABLE 4

SIBLINGS OCCURRING BEFORE AND AFTER THE CONTROL (CONTROL DEFECTIVES)

<i>Benda</i>	Control mental defectives	Siblings born before control	Siblings born after control	Total
Expected	255 (17.2%)	609.5 (41.3%)	609.5 (41.3%)	1,474 100%
Observed	255 (17.2%)	655 (44.4%)	564 (38.2%)	1,474 100%
<i>Dayton</i>				
Expected	4,316 (18.8%)	9,293 (40.5%)	9,293 (40.5%)	22,903 100%
Observed	4,316 (18.8%)	8,999 (39.2%)	9,588 (41.8%)	22,903 100%

loid child is not complete, as a small number of children are born afterwards. The condition of the mother is not irreversible; and yet, the material shows that the birth of a mongoloid child marks a turning point which is followed by a decided diminution in the number of children born subsequently.

In Table 5 the birth order of mongoloid children is presented. In order to show that the peculiarities of the birth order are not confined to the Wrentham material, material from a recent publication of Sakari Lahdensuu is added. Both charts show identical trends. There is a definite difference between those families where the mongoloid is among the first 5 children and where the mongoloid is born in a family of more than 6. In contrast to Table 1 in which mentally deficient

mongoloids are, therefore, the last living child than appear in that position on our table. In these families, the siblings born before the mongoloid appear normal. The mothers of these families have revealed no pathology in their younger years and have offered evidence of their ability to give birth to a rather large number of normal children. Not before the mother is approaching the end of her childbearing period or has reached the condition in which menstruation had become irregular, the pathology in her offspring occurred.

We mentioned that it seems of importance at which age the normal pregnancies occurred. From our table we learn that many of the normal siblings were born after the mother was 30 years of age; the 6 to 15

pregnancies which some of these mothers had are not spread over a period of 10 to 20 years but are sometimes found crowded into a rather short period after the maternal age of 30. Obviously childbearing after 30 represents a heavier strain on the organism of the mother than would the same number

being the most noticeable causative factors—exhaustion, illness of whatever kind during the period of gestation may produce imperfection in the evolution of the foetus and its tissues which we know as mongolism."

Age and exhaustion, however, cannot be the only factors, because we find in our other

TABLE 5

ORDER OF BIRTH IN 255 MONGOLOIDS AT THE WRENTHAM STATE SCHOOL COMPARED WITH DATA OF LAHDENSUU (174 CASES)

Order of birth of mongoloid	No. of children born in family															Total No. of mongoloids
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1.....	20	12	8	1	3	..	..	..	..	..	..	..	..	..	..	44
2.....	..	40	9	4	1	..	..	1	..	..	..	..	..	..	..	55
3.....	33	9	4	2	1	..	..	..	..	..	..	..	..	49
4.....	20	5	1	..	..	..	..	..	..	..	..	..	26
5.....	11	4	..	..	..	..	..	..	..	..	..	15
6.....	7	5	1	..	..	..	..	..	..	..	13
7.....	7	5	..	1	..	..	..	..	..	13
8.....	5	6	1	1	..	..	1	..	14
9.....	6	3	..	..	..	..	..	9
10.....	5	..	1	..	..	..	6
11.....	5	1	1	..	..	7
12.....	1	1	..	..	2
13.....	1	..	..	1
14.....
15.....	1	1
	20	104	150	136	120	84	91	96	108	100	66	36	39	14	15	255

Total children born in these families, 1,179

SAKARI LAHDENSUU

Order of birth of mongoloid	No. of children born in family													Total No. of mongoloids
	1	2	3	4	5	6	7	8	9	10	11	12	13	
1.....	36	11	2	1	1	..	..	..	..	..	..	..	..	51
2.....	..	18	4	1	2	1	..	..	..	..	..	..	..	26
3.....	14	3	2	..	..	1	..	..	..	..	..	20
4.....	20	..	2	..	..	..	..	..	..	..	22
5.....	9	..	..	1	..	..	..	..	..	10
6.....	8	1	1	1	..	..	..	..	11
7.....	12	2	1	1	..	..	..	16
8.....	5	..	..	..	..	..	5
9.....	4	..	..	..	..	4
10.....	2	1	..	..	3
11.....	3	1	..	4
12.....	1	..	1
13.....	1	1
	36	58	60	100	70	66	91	80	54	30	44	24	13	174

Total children born, 726

of children in a young mother. The observation on this group of families seems to confirm the theory of Shuttleworth who called the mongoloid idiot an "exhaustion product," the occurrence of which is "dependent upon conditions adversely affecting the maternal reproductive powers; the advanced age of the mothers and the frequent childbearing

group that a large number of mongoloids are the first children in the family and that the total number of children in these families is rather small. If one investigates the correlation between the age of the mother and the number of children we find that mongoloids occur mainly under two conditions. Of those 8 mothers who were above 45, all

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had more than 3 children with a total of 56 children. Among 56 mothers between 40 and 44, 40 had more than 3 children, totalling 264 children, but in 5 instances, the mongoloid was the result of the first pregnancy. In our age group between 35 and 39, we find 84 mothers of whom 43 had more than 3 children, totalling 228 children, while 9 in that group had no child before. We might therefore conclude that the risk of child-bearing at an age beyond 35 is increased in any case, regardless whether many pregnancies or no pregnancy had occurred be-

fertilization may find an unprepared organism which is too slow or insufficient to accomplish the necessary adjustments of the endocrine environment. If mongolism occurs in the first pregnancy, the mother may be well able to react normally in a second and third pregnancy.

It seemed to us of special interest to collect more data in regard to the conditions under which mongolism occurs in mothers of a younger age group. Not every case of our material yielded satisfactory information and the birth of a mongoloid child remained

TABLE 6

NUMBER OF MOTHERS BEARING CHILDREN BEFORE AND AFTER MONGOLOID BIRTHS

BEFORE MONGOLOID BIRTHS						
Age group of mother	No. of mothers	No child	One child	Two children	Three or more children	Total children
15-19.....	4	4	0	0	0 (0 children)	0
20-24.....	26	14	10	0	2 (7 ")	17
25-29.....	29	4	9	10	6 (23 ")	52
30-34.....	48	8	14	18	9 (45 ")	95
35-39.....	84	9	18	14	43 (228 ")	274
40-44.....	56	5	4	7	40 (264 ")	282
45-49.....	8	0	0	0	8 (56 ")	56
Total.....	255	44	55	49	108 (623 ")	776

AFTER MONGOLOID BIRTHS						
Age group of mother	No. of mothers	No child	One child	Two children	Three or more children	Total children
15-19.....	4	1	1	0	2 (8 children)	9
20-24.....	26	8	9	7	2 (9 ")	32
25-29.....	29	16	5	5	3 (10 ")	25
30-34.....	48	31	11	3	3 (12 ")	29
35-39.....	84	57	21	4	2 (7 ")	36
40-44.....	56	41	13	2	0 (0 ")	17
45-49.....	8	8	0	0	0 (0 ")	0
Total.....	255	162	60	21	12 (46 ")	148

fore. In the latter instance, the maternal organism has apparently lost its adaptability for pregnancy. In our age group of 20 to 24, we find 26 mothers of whom 14 had a mongoloid as their first child, but 2 women had given birth already to a total of 7 children; in the age group of 25 to 29, 4 mothers had no children before the mongoloid but 6 had borne a total of 23 children before.

We see, a rapid sequence of pregnancies may "exhaust" even a young mother and produce a temporary condition of unfitness for gestation. On the other hand, the first

entirely unexplained in some instances. In the remaining cases, however, the answers to a questionnaire yielded considerable information. We might attempt, therefore, to record the psychosomatic factors which we found most frequently present in mothers who gave birth to a mongoloid child at an age below 35.

In the following we comment briefly on each of these factors.

(1) The description of the mother as "high-strung," or extremely nervous, was found 62 times in our material. This high number refers in the first place to the 107

instances where the mother was below 34 years of age. It may be remembered that the "high-strung" type of woman shows a psychosomatic reaction which is characterized by psychic lability and by instability of circulatory and autonomic functions.

(2) The frequency of abortions is one

TABLE 7

PSYCHOSOMATIC FACTORS COMMON IN YOUNGER
MOTHERS WHO GAVE BIRTH TO A
MONGOLOID CHILD

1. High-strung, nervous, easily upset
2. Frequency of abortions
3. Bleedings during pregnancy
4. Inability to keep a full-term pregnancy (prematurity of baby)
5. Inability to become pregnant
6. Endocrine imbalance

were irregular or abortion was threatening, but prevented through rest. The continuation of menstruation during pregnancy indicates that the endocrine mechanism preventing a uterine bleeding is at fault.

(4) Table 9 shows the increased incidence of prematurity in mongolism. Of our limited number of cases where we found a definite birth record, prematurity was recorded 44 times in contrast to 12 instances of prematurity in our feeble-minded control material. It is frequently stated that pathologic pregnancies show increased tendency to premature expulsion, but our control material did not substantiate this assumption. Prematurity in mongolism is very likely a part of the general disorder which resulted in a mongoloid child.

TABLE 8

MISCARRIAGES AND STILLBIRTHS IN 255 MOTHERS HAVING A MONGOLOID CHILD

Age groups	No.	No. of mothers having miscarriages	No. of miscarriages before and after patient		Total
			Before	After	
15-19	4	1	1	0	1
20-24	26	5	0	5	5
25-29	29	7	6	6	12
30-34	48	19	21	7	28
35-39	84	29	42	12	54
40-44	56	15	19	1	20
45-49	8	4	6	0	6
Total	255	80	95	31	126

of the most striking features in case histories of mongolism.

This table shows that 80 out of 255 mothers have reported a total of 126 miscarriages. We have to remember how frequently this information is unreliable. And yet, our investigation showed that 95 miscarriages preceded the birth of a mongoloid child and 31 followed afterwards. The more material became available in recent years, the more frequently we found the first signal for threatening mongolism was given in a miscarriage.

(3) Probably closely related to the frequent miscarriages is another phenomenon which was observed by us. Many times the mother observed a continuation of her regular menstruation during the second and third months of her pregnancy which terminated in a mongoloid child. Sometimes bleedings

(5) An item of most interest is the inability of the mother to become pregnant. We observed in many instances where the mongoloid is the first or the second child, that the mother had waited in vain for a pregnancy, or an unusually long time had elapsed between her first and second child. Several times, the waiting period lasted as long as 17 years. The decreased faculty of becoming pregnant was evident in several instances before the mongoloid child was born. We see definitely impaired fertility after the mongoloid birth. It is true that there is quite a number of children born after a mongoloid and that the loss in fecundity is not absolute, but little attention has yet been paid to the fact how severely the maternal fertility has suffered in cases where a mongoloid child is born in her best years. Of our total of 255 mothers, 162 or

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64 per cent had no children afterwards. Only 1 mother in 3 had a child after a mongoloid. This statement refers to the whole material. The picture is more striking if we consider those cases only, where the mongoloid appears near the beginning of the childbearing period. In 17 per cent of our material, the mongoloid was the first child, in 45 per cent of these cases he remained the only child; in 73 per cent of the cases where the mongoloid was a second child, he remained the last child. (In Lahdensuu's material 63 per cent of the first born mongoloids remained only children and 69 per cent of the second born mongoloids had no younger siblings.) From the 4 mothers who had a mongoloid child between

considered by many as even "cute." 2. In more than half of our material, the mongoloid baby was not recognized as pathologic before several years had elapsed; there was plenty of opportunity for the mother to become pregnant again. 3. Control material of severe malformations (Little's spastic paraplegia, hydrocephalus, microcephalus and other striking conditions) shows that many of these cases are found in first children and that the majority of parents are not discouraged to have more children afterwards.

(6) Many investigators have been interested in the varying causes of mongolism. Brousseau-Brainerd were able to obtain definite data concerning the health of the

TABLE 9

BIRTH RECORDS OF MONGOLOID AND CONTROL PATIENTS

Age groups	15-19	20-24	25-29	30-34	35-39	40-44	45-49	Total
Premature:								
Mongoloid	1	7	3	12	14	6	1	44
Control	1	3	4	2	1	1	0	12
Instrumental:								
Mongoloid	1	5	4	5	7	8	0	30
Control	2	5	5	3	2	5	0	22
Prolonged labor:								
Mongoloid	1	2	1	3	6	6	1	20
Control	1	3	4	1	0	0	0	9
Cæsarian:								
Mongoloid	0	0	0	1	1	1	0	3
Control	0	2	1	2	1	0	0	6

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the age of 15 and 19 years, one had no other child and one had one child only afterwards. Of the 26 mothers of the age between 20 and 24 years, 8, or 30 per cent remained sterile for the rest of their lives. Of the 29 mothers aged 25 to 29, a total of 16 or more than 50 per cent remained sterile. These numbers prove beyond doubt that in the majority of cases, the birth of a mongoloid child reveals a maternal condition which renders unfit for childbearing afterwards. Since, some investigators have tried to explain the drop in the birth rate by assuming that after the birth of a mongoloid child the mother is afraid to have more offspring, we have checked this statement carefully and found it irrelevant for three reasons: 1. In contrast to those striking malformations like hydrocephalus or microcephalus, the mongoloid baby does not appear distasteful and is

mother in 376 cases and found in 179, or 47 per cent, the mother had been in ill health. Goddard goes so far as to state that "the sole and adequate cause of mongolian imbecility is to be sought in the condition of the mother during pregnancy." A rather large number of investigators felt that thyroid deficiency is of importance. Clark, Stoeltzner, Meyers, Alt, DeSanctis, Schob, Abderhalden and Vas expressed the opinion that either hyperthyroidism or hypothyroidism of the mother may account for the production of mongolism. Meyers in a study of 215 mongoloid cases and 215 controls "found some abnormal condition in the mother during pregnancy was reported in more than twice as many of the mongolians as the control mothers. An analysis of this difference in the health of the mother revealed a greater frequency of recognizable thyroid

disorders (9 to 1) and of acute nervous excitement (13 to 1)." In our material, thyroid troubles were found in the mother in 11 instances. This number is probably too small because of the fact that a number of histories were taken without consideration of a possible thyroid disorder of the mother.

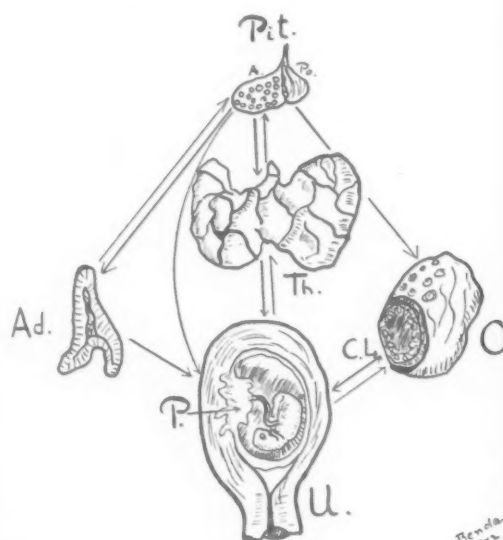
To summarize our investigation, we might say that mongolism occurs under three main conditions, first, at the end of a rather long line of pregnancies which sometimes followed each other in rather short intervals and occurred frequently after the age of 30 ("exhaustion" theory); secondly, in about 17 per cent, mongolism occurs in the first pregnancy either in young mothers or in aged mothers; third, in a small number of cases, mongolism occurs in the middle of the birth line due to temporary conditions.

The common denominator for all situations under which mongolism may occur is the threshold of sterility. The maternal organism appears to be unable to produce the proper endocrine environment for the embryo. The necessary adjustments are either delayed or insufficient, the result being that the fetus is deprived of a number of nutritional factors which are essential for its proper development. The maternal condition is due either to the approach of the menopause (women beyond 40 years of age) or to insufficient response to fertilization (young women, or women above 30 who had no children before). There is a third group of cases in which mongolism occurs on account of the fact that an intercurrent illness has rendered the mother temporarily unfit for a pregnancy.

Some investigators felt that an "over-aged" ovum may be the cause of mongolism. If such a faulty ovum were the cause, and aging of an ovum may more easily be found in older women, one would expect children born to older mothers to be generally more liable to manifest abnormalities than their fortunate siblings born before. General morbidity statistics, however, do not support such a theory. Moreover, the birth of a mongoloid child by a young mother could hardly be explained through the age factor. Another theory, favored by van der Scheer, blamed an abnormal nidation of the ovum, due to pathology of the uterus. We discard

this theory on account of the fact that the condition of the mother is reversible, while anatomical changes of the uterus cannot be expected to recover spontaneously.

Our material suggests that it is the inner secretory response to a pregnancy which is at fault. Fertilization puts a heavy tax upon the maternal organism which is met through a number of quick adjustments and changes in the endocrine environment. On Graph 5, the chief demands of pregnancy upon the endocrine environment of the maternal organisms are diagrammatically represented. Some of the finer adjustments of the en-



GRAPH 5.—Chief endocrine requirements of pregnancy.

docrine system are not yet fully understood; it may be pointed out that with every week of pregnancy the balance between the various endocrine organs changes. Immediately after fertilization, before the placenta is fully developed, the corpus luteum seems to be of special importance and its proper function is an essential factor for preventing abortion and guaranteeing a proper development of the fetus. In the last two-thirds of pregnancy, the placenta seems to take over numerous endocrine functions and the importance of the corpus luteum is decreased. It is known that faulty corpus luteum function is one of the main causes of abortion in the first part of pregnancy. This is primarily due either to dysfunction of the ovary or to

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insufficient production of the L.H. action of the pituitary. The pituitary reacts to a pregnancy through development of the so-called "pregnancy cells" which are suspected to produce some of the essential growth hormones (Erdheim). It is probable that in mongolism either the maternal pituitary or the corpus luteum itself is at fault. We have overwhelming evidence that the mongoloid child occurs mainly on the threshold of hormonal sterility.

TABLE 10

CHIEF DEMANDS OF PREGNANCY UPON ENDOCRINE ENVIRONMENT OF MATERIAL ORGANISM

Pit: Pituitary: Development of "pregnancy cells"

Increased production of

1. Growth hormones
2. Adrenocorticotrophic hormone
3. Thyrotropic hormone
4. Gonadotropic hormone
5. Luteinizing (L.H.) hormone
6. Glycotropic hormone

Th: Thyroid: Thyroxin:

1. Direct influence upon growth of embryo
2. Indirect: maintenance of maternal metabolism
3. Action upon ovary?
4. Action upon adrenals?

Ad: Adrenals:

1. Cortical influence upon sex differentiation
2. Gluconeogenesis
3. Metabolic action

O: Ovary: Estrogenic substances

CL: Corpus luteum: Progesterone (pregnane-diol)

Influence upon growth

U: Uterus

P: Placenta:

1. Estrogenic substances
2. Gonadotropic hormone
3. Progestin

Mongolism as yet shows but little response to therapy. Besides the fact that the proper pituitary hormones are not yet isolated and available for therapy, one of the main reasons for the failure of therapy seems to be that it is impossible to restore a pathologic development of the antenatal period during postnatal development.

The main purpose of our investigation is to suggest means which will prevent the occurrence of mongolism. The presented data show that among the millions of women who

are pregnant every year, only a small percentage seems to be in danger of having a pathologic pregnancy. The number of prospective mongoloid mothers is therefore limited. A careful medical history makes it possible to single out those mothers who seem to be endangered. If these mothers are subjected to careful biochemical and metabolic studies, evaluation of the results may provide means to recognize a maternal endocrine deficiency during prenatal care. Since endemic cretinism has been recognized as a "deficiency disease" (Marie) and routine administration of iodide has been introduced in sections which are known to be mostly endangered, endemic cretinism has lost much of its importance and the number of cretins who require permanent care, is nowadays rather small. At present, mongolism represents the most important single item in low grade mental deficiency of infancy and childhood—the prevention would mean the elimination of a large number of feeble-minded patients who otherwise need care throughout their lives.

SUMMARY

(1) It is our opinion that mongolism is not due to hereditary factors. If it were due to these factors, the incidence of mongolism should increase in proportion to the number of offspring according to Mendelian expectation. Although many mongoloid children have 5 to 12 siblings, no multiple incidence of mongolism is found in any of these families. Mental deficiency in a family is no protection against mongolism, but the coincidence does not explain the particular growth disorder of the mongoloid child.

(2) The theory based mainly on twin research, that mongolism is due to a germinal (plasmatic) disorder does not hold. It is demonstrated that the observations on mongoloid twins are open to various interpretations.

(3) The third theory to explain the occurrence of mongolism is that of a pathologic condition of the mother. The method of analysis which we adopted brings in our opinion conclusive evidence that the maternal condition at the time of pregnancy was at fault.

(4) A study of the birth order of mentally deficient children due to germinal factors shows that the birth of a defective child may be expected to occur at any place in the line of siblings. In an unbiased sample of families in which all children are analyzed, as many children are born before the individual with a given characteristic as after the affected individual. In some families, the affected child may be born first, in other families last. These differences cancel each other in the long run, and a balance of siblings born before and after the affected child is demonstrable. This point is proven by two lines of control studies; one is made on a material of 4,316 mentally defective children of all types and the other on a material of 255 hereditary cases at the Wrentham State School. In both independent studies, the result was that mental defect as a characteristic is not associated with any particular disturbance of the birth order. In an ideal sample, 50 per cent of brothers and sisters would be born before and 50 per cent born after the affected child. In our material 48 per cent were born before and 52 per cent afterwards in one line of studies and 54 per cent were born before and 46 per cent subsequently in the other investigation. This represents a variation which is well within expectation and offers proof of the theoretical assumption.

(5) In a study of the birth order of mongoloid patients, the striking result was found that 84 per cent of the total number of brothers and sisters was born before the mongoloid and only 16 per cent afterwards. Comparison with the control group shows that this is a significant deviation.

(6) The imbalance between the number of children born before and after a mongoloid suggests that the birth of a mongoloid indicates the development of a pathologic condition of the mother and bears a definite relationship to her ability to have children.

(7) It is indicated that the decline in the number of children after a mongoloid birth cannot be explained on psychological grounds.

(8) Mongolism occurs mainly under three conditions: (1) at the end of the childbearing period, when the mother is approaching the menopause; (2) at the beginning of childbearing, when the mother is immature or when the first child is born after a long period of waiting and the mother shows a delayed adaptability to the condition of pregnancy; (3) in the middle of the childbearing period due to intercurrent extrinsic factors.

(9) The common denominator for the condition, under which mongolism develops is the threshold of sterility. The sterility is caused by a hormonal imbalance which manifests itself in abortions, bleedings during pregnancy, prematurity and incapacity for conception. The mongoloid deficiency develops in a baby on the threshold of complete maternal sterility. Our material indicates that the maternal innersecretory response to a pregnancy is at fault.

(10) A careful inquiry into the birth records of mongoloid children reveals that the birth of a mongoloid child may be expected or even predicted in a certain percentage of cases. From a medical point of view, many mothers of mongoloids show indications that they were not in a perfect condition for pregnancy. It is our suggestion that pregnant women whose history indicates the possibility of a mongoloid baby should be subjected to careful biochemical and endocrine studies during prenatal care. Such examination will provide material to determine whether a mother suffers from an endocrine deficiency and will enable the physician to single out eventually a mongoloid pregnancy. This approach might not secure every case of this disorder, but might serve to reduce the number of mongoloids to a reasonable extent.

COMPARATIVE PSYCHOPATHOLOGY OF THE BRAIN-INJURED CHILD AND THE TRAUMATIC BRAIN-INJURED ADULT¹

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Clinical experience as well as experimental studies have revealed general characteristics of so-called organic behavior disturbances in brain-injured children.

Two years ago we presented before this association the results of various experiments dealing particularly with sensory and perceptual processes(9). The evidence gathered there pointed to a definite sensori-motor syndrome in the brain-injured mentally defective child. Visual-motor performance, demonstrated in such activities as the construction of mosaic patterns or three-dimensional tinker-toy models, showed signs of disorganization and incoherence between parts.

Since then, further work has been completed dealing with various perceptual, conceptual and general dynamic aspects of this disorganization. The results of these experiments support our assumption of the basic difference in mental organization between the brain-injured and the non-brain-injured mentally defective child(10). Some of these experiments will be mentioned in the course of this paper in which peculiarities found in brain-injured children will be compared with the general symptoms of brain-injured adults.

The organismic conceptions of Jackson(3), Head(2), and particularly Goldstein(4), based on analysis of the behavior of brain-injured adults, have led to a general biological view of the principal forms of disturbances of the central nervous system. Can certain principal forms of disintegration of the organism due to brain lesion be observed in the child as well as in the adult?

The following symptoms were selected for comparison.

¹ Read at the ninety-eighth annual meeting of The American Psychiatric Association, Boston, Mass., May 18-21, 1942.

From the Wayne County Training School, Medical Superintendent R. H. Haskell, M.D.

1. *Forced Responsiveness to Stimuli.*—It has been found that the brain-injured organism is influenced to an abnormally high degree by external stimuli.² This phenomenon plays an important rôle in brain-injured children as has been demonstrated in our various perceptual, conceptual and problem-solving tests. One example taken from the series of sensori-motor tests may suffice(11). In a tactual-motor test the child was asked to perceive tactually three figures—a square, an oval and a triangle. The figures were presented in two sets of boards. In the first set the background was composed of rows of flat enameled thumbtacks; the figure was formed by semi-spherical rubber tacks. In the second set the background was flat and smooth and the figure wooden solid. In the first set the brain-injured children were slow in the initial exploration; they were particularly attracted by single tacks, examining the shape and size of the elements. However, they had no difficulty on the second set.

The literature on brain-injured adults contains many observations comparable to the example presented(4).

2. *Fixation and Perseveration.*—Related to the forced responsiveness to stimuli are such phenomena as abnormal fixation, inability to shift, perseverative tendencies and the like. A discussion on perseveration in adults can be omitted here since it is a well-known neurological and psychiatric symptom. In brain-injured children, however, in spite of casual reports, only recently the specific nature of this phenomenon has been demonstrated by our experiments. In one experiment the material presented consisted of rhythmic tone patterns which were electri-

² Kraepelin called this symptom hyperprosexia which means an exaggerated arousal of attention and inability to ignore the stimulus. This symptom has been observed in many organic psychoses. Goldstein speaks of forced responsiveness and "stimulus-bond"; Homburger describes this same phenomenon as "hypervigilance" in postencephalitic children.

cally produced by pressing a key. The rhythmic elements differed in length and number. The child had to repeat the tone-pattern given by the experimenter. In a second experiment, cards presenting black and white drawings of objects such as a boat or a baseball were shortly exposed. The child had to tell what kind of object he saw. Thirty cards made up the experiment. In both experiments the brain-injured children made a significantly greater number of perseverations than the non-brain-injured children. Moreover, there were certain types of perseverations typical only for the brain-injured child. Such a specific perseveration is the so-called repetitive perseveration, that is, a repetition of one response occurring over and over again throughout the series of trials. Another is the so-called delayed perseveration; here the repetition occurred after several correct responses have been already made throughout the series.³

3. *Instability or Fluctuations of Reactions.*—In apparent contradistinction to the abnormal fixation and perseveration there appears a symptom which we may call instability or fluctuation of reactions. We may refer to observations in an experiment specifically devised to analyze thought processes(10). The test material consisted of two pictures representing a boy who is about to be drowned, and a building on fire; there were furthermore many small objects of men and animals, cars, trees, tools, etc. The child had to select and place in front of either of the two pictures, those objects which he thought went best with each picture, and to discard the other objects. For the non-brain-injured, normal and subnormal child the objects had mostly a stable, that is, an ordinary, standard meaning. For the brain-injured child the meaning of the object was, so to speak, pliable, changeable according to the situation of which the objects were made a part. For example, there was a red poker chip among the objects. The non-brain-

injured children always discarded the poker chip whereas the brain-injured children frequently interpreted the poker chip in accordance with the association present in their minds. They placed the red poker chip as a Boy Scout badge, or as a rug on a table, or as a picture on the wall, or as a red stop-light. Such pliability may even bring about a change in the meaning of an object during the process of selection. One child placed the cup with water before the fire picture explaining, "This is water for putting out the fire." Later he picked up the cotton-stick and placed it on the top of the cup, saying, "this is the medicine for the sick people."

Instability of conception showed itself in still another way. The brain-injured child often lost sight of the main test and became involved in some particular detail of the situation. Instead of placing all objects with reference to the picture with the drowning scene, a brain-injured child suddenly conceived of the region in front of the picture as a garden; he put in garden tools, trees, benches, and a human figure as gardener. The arrangements of objects by brain-injured children contained many such irrelevant clusters; these were practically absent in non-brain-injured, normal and subnormal children.

The inability to "stick to the point," the lack of limiting control was again obvious in that the brain-injured child did not restrict himself realistically to the immediate situation of the test. He tended to transcend the boundaries of the present event, expanding it into the past and the future. Table, chair, fork and spoon were placed before the picture with the drowning scene. The usual explanation was: "After the boy has been saved he has got to eat." Sometimes the drowning situation was enlarged to the point where the boy was brought to the hospital. A child selected the letter with the remark: "because it is sent to the boy when he is in the hospital." The boat was related to the drowning picture because, "when the boat was coming he did not know to get out of the way and was drowning."

Goldstein(5) has observed various forms of fluctuations in the reactions of brain-injured adults. He quotes the self-observation of one of his patients who said, "Every-

³ Another expression of this pathological change in brain function is the prolonged after-effect of external stimulation, or, according to Goldstein, the prolonged after-sensation in patients with lesions in the central sensory area. In brain-injured children visual stimuli have an abnormal endurance as found in flicker and stroboscopic experiments(12, 13).

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thing in me is changing continually. . . . Strong and weak, now this way, now that way; one does not know what's coming; one is completely powerless."

Probably related to the symptom of fluctuation in the impairment of brain-injured individuals is the inability to integrate two points of view, or to perceive a double relationship. A patient, reported by Bouman and Gruenbaum(1), though able to differentiate between left and right, above and below, was unable to point correctly when asked, "Show me a point above and right" or "left and middle" on a sheet of paper.

We observed frequently(9) that the brain-injured child failed in the construction of interlocked figures on the marble-board because he was unable to place a marble correctly at a crossing point, i.e., he could not grasp the double relationship of a particular marble with respect to two different lines.

4. *Meticulosity and Pedantry.*—Any task of grouping or relating objects requires execution and systematic arrangement of material; over-stressing, however, of orderliness, meticulousness and pedantry in the execution is an abnormal feature observed in brain-injured adults as well as in brain-injured children. Goldstein(4) describes clearly the behavior of such a patient who consistently corrected the "disorderly" placement of the physician's paper and pencil on a table. Brain-injured children, for instance, in the picture-object test, placed the objects meticulously in a half circle around the picture, or they placed the bridge in a correct right angle or parallel to the picture. This pedantry may be the child's compensatory reaction to his dissociative tendencies, his only way out from potential chaos. Goldstein interprets the brain-injured patient's orderliness as a protective device for avoiding catastrophic reactions.

5. *Substitute Activity.*—There are other compensatory reactions of the brain-injured organism. A patient who cannot achieve a task because of his manifold defects, may substitute for an impaired function a function still retained. Goldstein's(4) "mind-blind" patient could not read because he was unable to identify letters or figures from purely visual impressions; but he read by moving his head and eyes. This moving

along the contour enabled him to recognize the shape of letters. Our children, unable to construct a figure in the marble-board test through immediate perception, could obtain a correct solution simply by counting the holes for the placement of each single marble.

In Summary.—Clinical and experimental observations reveal that certain fundamental pathological characteristics of the brain-injured adult are also found in the brain-injured child. A word of caution should be added, however, concerning the probability of the existence, not only of similarities, but also of differences with regard to general symptoms: we found several peculiarities in the behavior of brain-injured children which cannot as yet be corroborated by the findings in adults. It is, for instance, still an open question whether the concrete behavior of the brain-injured adult can be directly compared with the concretism of the brain-injured child or whether in the latter we are dealing with a deviation from a genetic trait of behavior. There may be differences due to the occurrence of the child's brain injury before the full development of neuropsychological functions.

If we turn now to the *practical implications* of our theoretical discussion we may be satisfied that, on the whole, the material presented supports the assumption that methods of re-educating brain-injured children have significance for the rehabilitation of adults. We wish to refer briefly to methods which were specifically devised to overcome the general pathological inabilities of brain-injured children and which have been successfully applied for many years (6, 7, 8). One of the general educational aims is to strengthen the process of integration in the various performances. As an example, we may refer to a boy whose drawings indicated an inability to keep an outlined form apart from a surrounding. He failed in the task of filling with colored crayon the outline of a fish on white paper because he could not keep to the contour. In Goldstein's terminology he was deficient in separating the figure clearly from the ground. In such a case it may sometimes be sufficient to strengthen the relief of the figure against the ground, for instance, to

make the outline of the fish more distinct in color. Since this device proved ineffective here we strengthened the contour by more and various cues. The child had first to color a white square. This square formed the inner part of a yellow cardboard frame; the inner edges of the frame were outlined in black. By and by the guiding cues were removed, first the color cue, then the depth cue, *i.e.*, the solidity of the frame so that at the end the child was able to color carefully the outlined square figure. Whereas he had not learned to color such drawings during two preceding years, after three weeks of training he was able to color any kind of drawing.

Other methods aim at controlling distractibility during a performance. A boy to whom a paper with addition problems was presented, wrote the results wherever by accident his attention was drawn. By a device shutting off all the problems but one at a time, he rapidly learned to control this distractibility so that the crutch could eventually be removed.

As to the treatment of perseverative tendencies we agree with Goldstein(5) that "continued perseveration can be avoided to a certain extent by placing the perseverating patient before a task of quite a different character and one he can cope with." Another approach consists in the elimination of those activities which are prone to elicit perseverations. To illustrate, a boy was trained on the abacus, *i.e.*, a Chinese calculating machine. After having learned addition by moving the beads from right to left, he perseverated in the direction of movement, *i.e.*, he could not shift to an opposite movement necessary for subtraction. A device by which concrete number operations were retained but movement activity eliminated, enabled the boy to learn to subtract.

A further method of educational therapy consists in the attempt to substitute for a deficient function a function which is intact. If, for instance, a child has a reading disability, predominantly as a result of an auditory-kinæsthetic defect, we may strengthen visual cues. We were successful, for in-

stance, in training such a child to discriminate letters by shape and size as differentiating signals.

In conclusion, we may say that the work with brain-injured children offers an unique opportunity to study and to develop a great variety of remedial methods, since one is dealing with a large group which can be observed daily over years and for which exact measurement of progress can be obtained. Time does not permit us to discuss comprehensively the pertinent literature on psychopathology and treatment of brain-injured individuals. We hope we have shown that an understanding of the general disturbances due to brain injury can eventually lead to adequate methods of retraining.

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MEASURES OF SUSCEPTIBILITY TO NERVOUS BREAKDOWN¹

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I

An urgent problem in modern psychiatry is the prevention as well as the cure of nervous diseases. For this purpose it is necessary first to assay the vulnerability of the individual, by placing him in a test environment which will not impose too great a burden upon his nervous system.

Our present methods have been inadequate for this detection; treatment has proceeded much further than prevention. It is true that we obtain important information from the biographical (both family and individual) data, but this is difficult to get and often more difficult to evaluate; no careful records are available concerning the majority of individuals outside of a hospital. Furthermore this type of information does not come from controlled situations. The methods of psychiatric examination, in contrast to those of physical examination, have been based mainly upon verbal reactions. The I. Q. and mental status often bear little or no relation to what interests us chiefly about the patient. The E. E. G., thought objective, is poorly understood at present and probably measures metabolic factors which may or may not be related to the elements of vulnerability to nervous breakdown.

A method is required which is (1) *objective* (therefore varying minimally with the examiner); (2) capable of being *recorded* (and thus available for comparison by day to day and from one individual to another); (3) *quantitative* to a certain degree; (4) concerned with *significant* items, having a high correlation with the characteristics of the patient that are essential, viz., those that determine his susceptibility to break under stress.

The method proposed here for detecting vulnerability actively imposes a certain task upon the nervous system comparable to the various functional tests used in medicine for

the heart, kidneys, liver, etc. In this new method it is necessary first to establish the normal record for the given individual, i. e., his simple performance in an ordinary situation not too difficult; second, to place the individual under a graduated stress; and third, to detect the point at which the subject begins to deviate from the normal. It is important to note that the normal must be determined for that particular individual because what is normal for one is not normal for another; "one man's meat is another man's poison."

I. *The Establishment of the Norm.*—In spite of the general recognition now among psychiatrists of psychosomatic relations, I

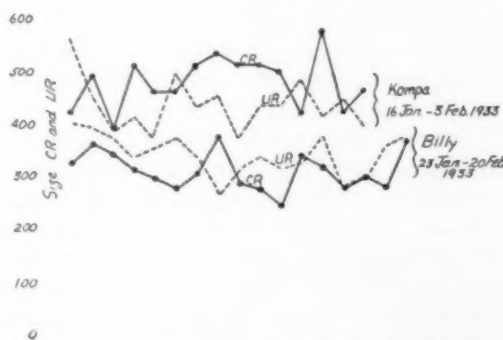


FIG. 1.—Comparison of daily variations of CR and UR in two dogs.

wish to ascribe proper credit to Pavlov for having first irrefutably demonstrated experimentally the truth of "no psychosis without neurosis," viz., that the physical can be objectively recorded in a somatic reaction. For this he used the salivary secretion as a measure of psychic excitation or inhibition. The conditional reflex is the measure of this somatic reaction.

That psychic phenomena are as subject to laws as the so-called physiological has been clearly demonstrated. In this laboratory it has not only been shown that there is as little daily variation (in a rigidly controlled situation) of the conditional reflex (CR) as of the unconditional (UR) (Fig. 1), but the CR can be expressed in an equation as readily as can the UR. Thus for the salivary

¹ Read at the ninety-eighth annual meeting of The American Psychiatric Association, Boston, Massachusetts, May 18-21, 1942.

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cr the formula is $cr = a + b(1 - e^{-cQ})$,² an exponential relationship, while for the UR secretion of salivation the formula, $UR = a + bQ$, shows a linear relationship.

These formulæ simply mean that as the intensity of the stimulus is increased the cr at first increases but soon stops increasing or increases very slowly with added stimulation; while within the same limits the UR increases equally with each unit of added stimulus whether the unit is added to the basic large or small stimulus. Individual variations are accounted for by the constants (for a given individual) a , b , c .

We have extended the work of Pavlov to other autonomic functions. The sensitivity of the heart rate in human subjects has been demonstrated by Whitehorn, and the cardiac conditioned reflex in dogs is one of the most interesting to show a quantitative relationship to the stimulus. For each individual there is a certain change in the heart rate accompanying each type and intensity of excitatory cr, and another change in the heart rate accompanying inhibition. That the cardiac cr is a more delicate measure of activity is convincingly shown by its persistence in dogs after a long period of rest when the other components (motor and secretory) have disappeared (experiments of Tunick in this laboratory). Thus the heart rate is a reliable quantitative measure of the intensity of conditioned excitation and inhibition. This seems the more remarkable when we consider that these measures of heart rate are made for very short periods, viz., 3 to 10 seconds, while the conditioned stimulus is acting.

The following chart (Fig. 2) shows that there is a change in heart rate during the cr which is practically equal to the change in heart rate during the UR and that there is a smaller change in heart rate during inhibition. That the increase in heart rate accompanying the cr represents a measure of the conditional reflex or emotional tension, or in other words the conditional excitation is

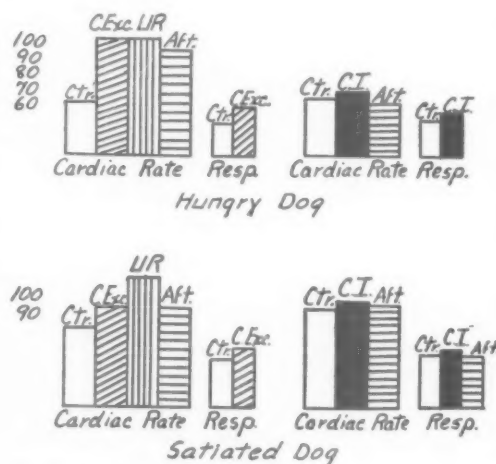
² Gantt, W. Horsley. The nervous secretion of saliva: the relation of the conditioned reflex to the intensity of the unconditioned stimulus. *Am. J. Physiol.*, 123: 1, 74, July 1938.

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shown by the fact that in a satiated dog there is no conditional secretion nor a cardiac cr during the signal for food, and the animal also refuses to take the food.

Changes in respiration accompanying the crs have been frequently noted (Bechterev, Watson, Kellogg, Gantt, Liddell).

II. *The Production of Strain.*—Some physiological conditions, as well as pathological, produce internal states which lower the threshold at which the breakdown occurs, make the animal highly susceptible. Thus during the postpartum period in the dog,



Ctr. = Control.
C. Exc. = Excitatory conditioned reflex.
UR = unconditioned reflex.
Aft. = heart rate immediately following UR.
C. I. = inhibitory conditioned reflex.
Resp. = respiratory rate.

FIG. 2.—Excitatory and inhibitory crs before and after satiation.

simply subjecting the animal to the routine conditional stimuli results in an imbalance. This was first noted in a dog (Kompa) in 1930 and it has been seen subsequently in others. The following chart (Fig. 3) shows the drop in the salivary cr in Kompa on the first few days postpartum. In another dog (Zee) no change was observable in the motor crs, but by taking a more delicate measure, viz., the cardiac cr, it is evident soon after the birth of the puppies that there is a deviation of activity recorded in the cardiac crs (Fig. 3). A similar disturbance occurs in male dogs confined near a dog in estrus.

Natural emotional shocks also produce marked disturbances in the cr activity, al-

though these cannot always be observed by the usual means of examination. Two examples follow. In April 1931 the dogs in the laboratory escaped from the paddocks, got into strange surroundings, and had to be forcibly returned; they fought among themselves and were whipped by the night watchman. Fig. 4 shows the change produced in the cr activity in various individuals; the stable animal (Billy) was only slightly affected while an excitatory one (Kompa) was severely disturbed as was the inhibitory animal (Blue). After this event there were parallel changes in the ordinary observable behavior, Billy being affected very little and only for one day, while Kompa

revealed the much greater deviation in the labile Kompa than in the stable Billy; similar to the change seen in Fig. 4.

In the above instances it was only by establishing previously a normal base line that we were able to see the pathological state reflected in the cr; for the criterion is a change from the normal for that particular individual.

Let us next consider artificial strain—produced deliberately and under controlled conditions in the laboratory, and the way in which dogs of different temperament behave under this imposed stress.

It is necessary to emphasize that by no ordinary method of observation was it pos-

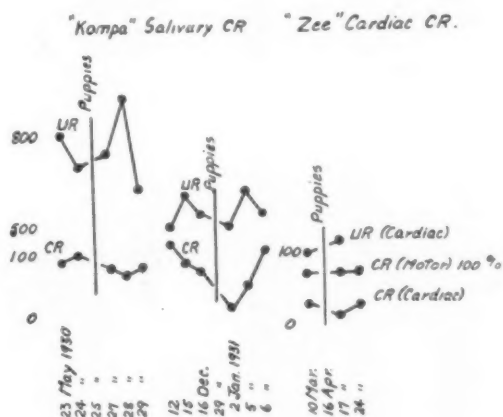


FIG. 3.—Effect of parturition on CR.

was much subdued for three days; and Blue slunk into the corner and kept his tail tucked though he was usually friendly and playful, and was inactive for a week. However the change in the crs outlasted any disturbance of behavior that could be detected by ordinary observation.³

Another instance occurred in 1932, involving the labile dog Kompa and the stable Billy—showing that the stable one was again stable and the labile one (Kompa) disturbed for a long time. These animals were seen fighting on March 18, 1942. They had been fighting for about 24 hours, and appeared equally exhausted and wounded; they could barely walk and had to be carried to the experimental camera. The salivary cr record

³ For a detailed account of this condition see Gantt, W. Horsley. *The Experimental Basis of Neurotic Behavior*. Harper Bros., N. Y. 1943.

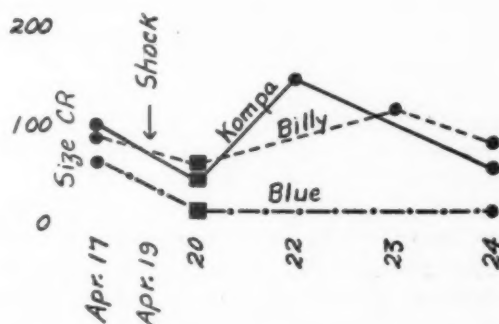


FIG. 4.—Effect of natural emotional shock (escape from paddock) on CR in 3 types dogs—excitatory labile (Kompa), stable (Billy) and inhibitory labile (Blue).

sible in these dogs to distinguish the susceptible and labile from the stable. I have asked many psychiatrists and physicians and I have tried myself to predict from ordinary contacts with the dogs or from knowledge of their breed, etc., which ones will break down first. Even after long periods of ordinary observation gained by playing with and feeding the animal, accurate prediction is not possible. The individual must be placed under a definite stress and deviation from his normal measured. Photographs of these dogs did not reveal which are susceptible, although the following test situations do.

In dogs C and D the establishment of crs was started at the same time. From the next chart you will see that C quickly made a differentiation between the inhibitory and excitatory metronoms, giving the proper response to each, while D is hyper-reactive, con-

tinually reacting to the inhibitory as well as to the excitatory stimuli. D also showed more disturbance of the overt behavior in the test situation—e. g., whining, restlessness and barking. The first chart (Fig. 5) is a record of the crs measured by the muscular movements—the withdrawal of the foot to the signal for a faradic shock.

The next charts (Figs. 6 and 7) show the parallel change in the respiration: even at

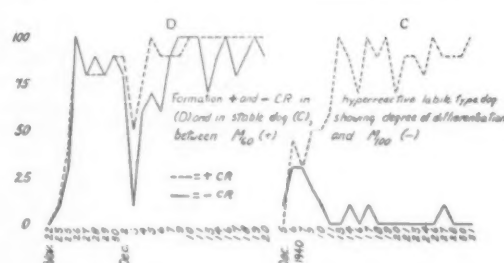


FIG. 5.—Differentiation in labile and stable dogs.

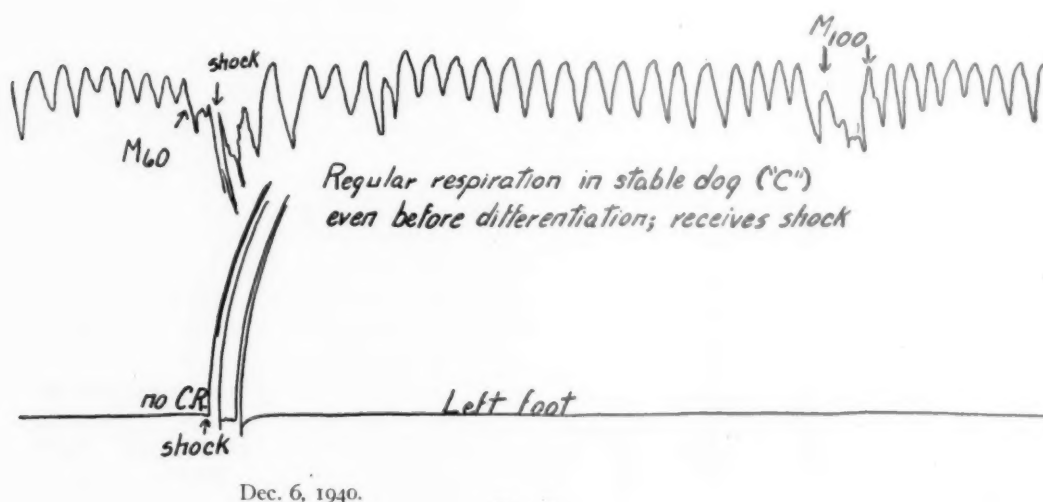


FIG. 6.

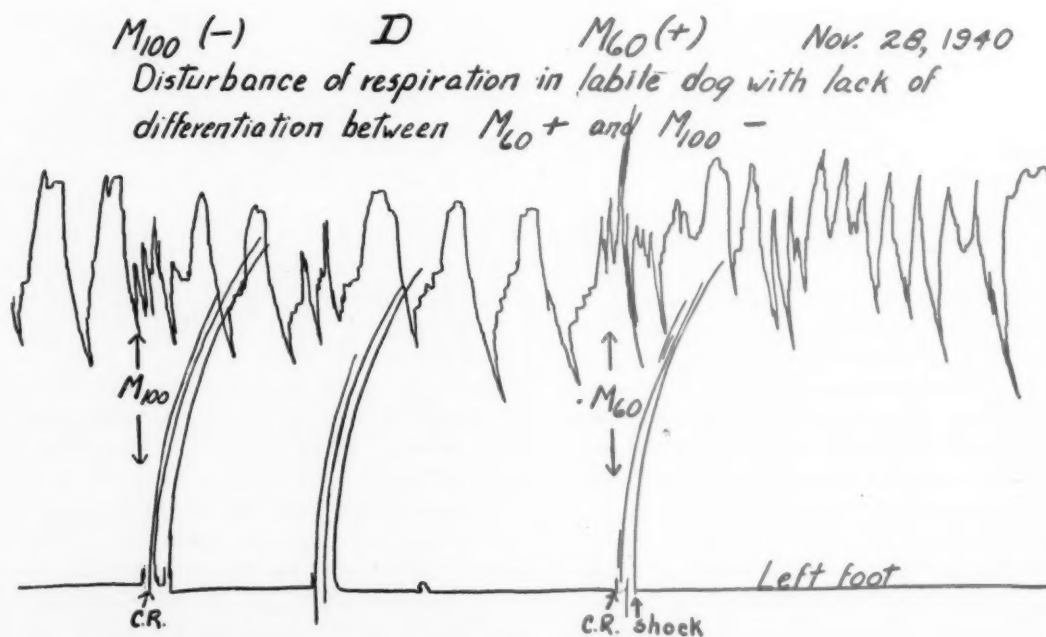


FIG. 7.

the time that C could not make the differentiation there was little disturbance in the respiration, but in D there were marked changes evident though only when the differentiation became difficult.

The cardiac crs showed a parallel disturbance. Normally both dogs give changes in the heart rate during the action of the conditioned reflex; but in C the changes were not so marked as in D. The difference in the two dogs is brought out much more clearly in the cardiac crs where the situation is made more difficult, thus on Novem-

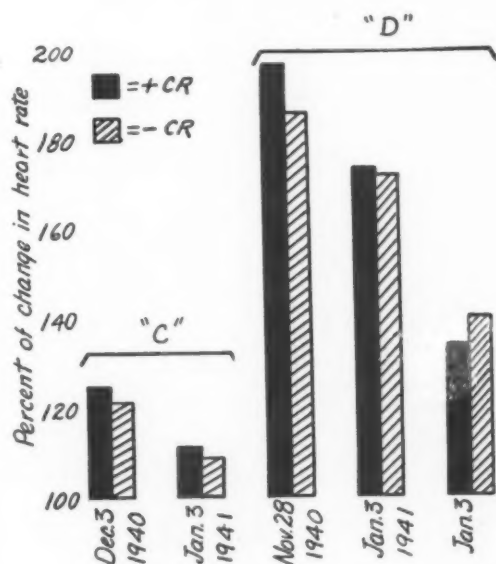


FIG. 8.—Conditioned cardiac rates in stable dog (C) and labile dog (D) during strain (Nov. 28–Dec. 3) and during good differentiation (Jan. 3). Control represented as base line, 100%.

ber 28, 1940, in D the cardiac rates increased from 100/min. with the normal cr to about 200 with the cr when the differentiation was difficult (Fig. 8). Actually C showed a decrease in heart rate to the normal cr but a greater decrease to the difficult differentiation, while D had an accelerated heart rate to the normal cr but a more marked acceleration with the difficult differentiation. Whether the heart rate is decreased or increased depends upon the individual.

The salivary secretion is an autonomic function that has been made the conventional measure of the Pavlovian cr. Fluctuation from the normal behavior may begin

with a disturbance too slight to be detected by present methods in any other way than by the measure of the autonomic cr, and if the conflict is prolonged the deviation may continue until not only all the artificial laboratory crs are abolished in the situation of conflict but also even all crs to the old strong stimuli (sight and smell of food). An example of the acute disturbance is seen in the chart of Kompa; the introduction of an inhibitory metronom depressed the old well-established crs but for a period of only five to ten minutes after the disturbing metronom. Each time the inhibitory metronom was given (for 30 seconds) the effect of subsequent positive conditional stimuli was diminished or reduced to zero. Recovery occurred within a few minutes. However in another dog, Nick, all the positive food crs (motor and secretory, natural and artificial) were abolished when the animal was simply brought into the old environment—even as long as 9 years after the original conflict—but the unconditional reflex secretion was unchanged. Thus on March 2, 1932, before the conflict the cr salivary secretion was 0.4 cc. in 10 seconds but on June 27, 1932, after the conflict and even to 1942 the cr secretion remained zero. In contrast to the labile dog, Nick, in the stable dog, Fritz, subjected to the same environment of conflict there was only a slight disturbance in ordinary behavior and in the salivary crs which lasted for a few days instead of years.

The external behavior of the two dogs under strain—in the laboratory situation of conflict—is often significant, but seeing the two animals under ordinary circumstances would not give a clue as to which one would break down. To the same tone that was used several years previously in a difficult differentiation connected with food Nick tugs to get away from the source of the tone, panting, tense, with a marked sexual erection, while Fritz pays no attention to the tone but calmly looks toward the experimenter.

Although we are not concerned here with chronic changes except as evidence of the lability, Nick had a pronounced gastric hyperacidity (experiments in collaboration with Arnold Rich) in the environment of conflict.

The sexual reflexes are a delicate barometer of the strain to which the animal is subjected. There may be with a slight conflict only a temporary change in sexual reflexes; there are in the environment of conflict on the one hand, abnormal sexual erections, and, on the other hand, a decrease in sexual activity resembling impotence.⁴

Besides the actual drop in the conditioned reflexes, the *degree of fluctuation* of both conditioned reflexes and other functions is an important evidence of pathology. This is reflected in chemical metabolic changes, *e. g.*, in the blood sugar tolerance after a glucose test meal. Diethelm,⁵ Bridge and others have shown that the curve of blood sugar bears a relation to the acute emotional state of the organism. In 3 dogs of varying susceptibility who had repeated glucose test meals it was found that the most labile (Nick) had the greatest fluctuations from day to day, that the most stable (Fritz) had the least fluctuation and that Peter whose disturbance of behavior was intermediate between Nick and Fritz, had fluctuations of blood sugar intermediate between Nick and Fritz. After standard deviations are made between all the zero hours on successive tests, all the $\frac{1}{2}$ hour readings on successive test-days, etc., again Nick shows the widest range of fluctuations; *e. g.*, that (σ) for Fritz=8.6, for Peter=10.3, for Nick=18.0.

In another function, the day's 24-hour running activity, it also appears that not the absolute activity but the *change* in this activity⁶ is the important factor of susceptibility. For example, Nick and Brenda were the two dogs with the most pronounced neurotic disturbances, but Nick was the most active and Brenda the most inactive of all in the laboratory. Nick's activity fluctuated

widely after he became neurotic; Brenda, who was formerly a pet in my home, had a remarkable drop to almost complete inactivity for several weeks, every time she was brought into the laboratory. This was parallel to her pathological behavior; she gave the signs of a marked depression, standing motionless with tail tucked, head hung for long periods, hardly moving from one spot during the 24 hours. The inactivity recurred every time she was brought into the laboratory. She finally died in the laboratory ap-

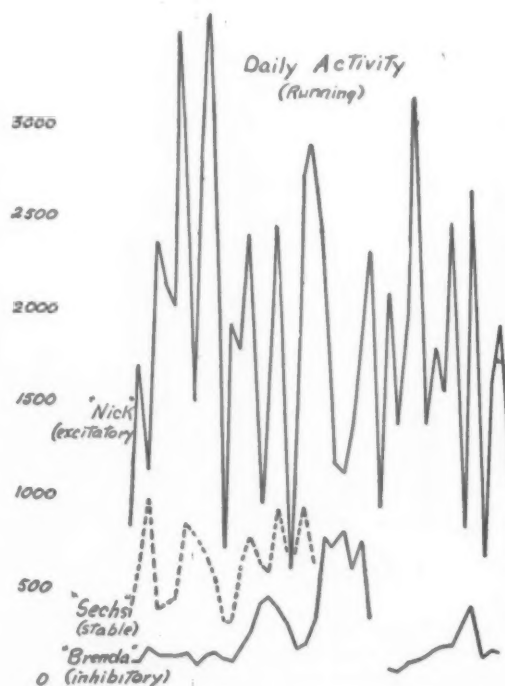


FIG. 9.

parently in a depressed condition. See Fig. 9 of the two labile dogs and the stable animal Sechs.

II

The above records on dogs convince one that susceptibility to breakdown can be detected in a variety of objective measures when the animal is placed under a definite stress. Though the method has not been so thoroughly worked out for the human subject, I have considerable data in both the normal and psychotic indicating that a similar procedure may be used. A slight artificial

⁴ This question is too complicated to discuss here; a fuller account is given in my monograph, "Origin and development of nervous disturbances in behavior of dogs experimentally produced." Psychosomatic Medicine (in press).

⁵ Diethelm, Oskar. Influence of emotions on dextrose tolerance. Arch. Neur. and Psychiat., 36: 342-361, Aug. 1936.

⁶ Gantt, W. Horsley, and Muncie, Wendell. Analysis of the mental defect in chronic Korsakov's psychosis by means of the conditioned reflex method. Bull. Johns Hopkins Hosp., LXX: 6, 467-487, June 1942.

Brenda,
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conflict is produced by the conditioned re-
sponse technic⁷; the problem is made gradu-
ally more difficult, at the same time care-
fully recording the reactions. In a normal
subject the response is seen to be regular
and undisturbed by the test situation and
the differentiation, and the movements (posi-

Contrast this record with two abnormal
ones. The first is an hyperactive schizo-
phrenic with anxiety (Fig. 11). Here it is
seen that the respiration is markedly dis-
turbed, revealing the anxiety; subsequently
as the patient developed the ability to differ-
entiate there was less disturbance.

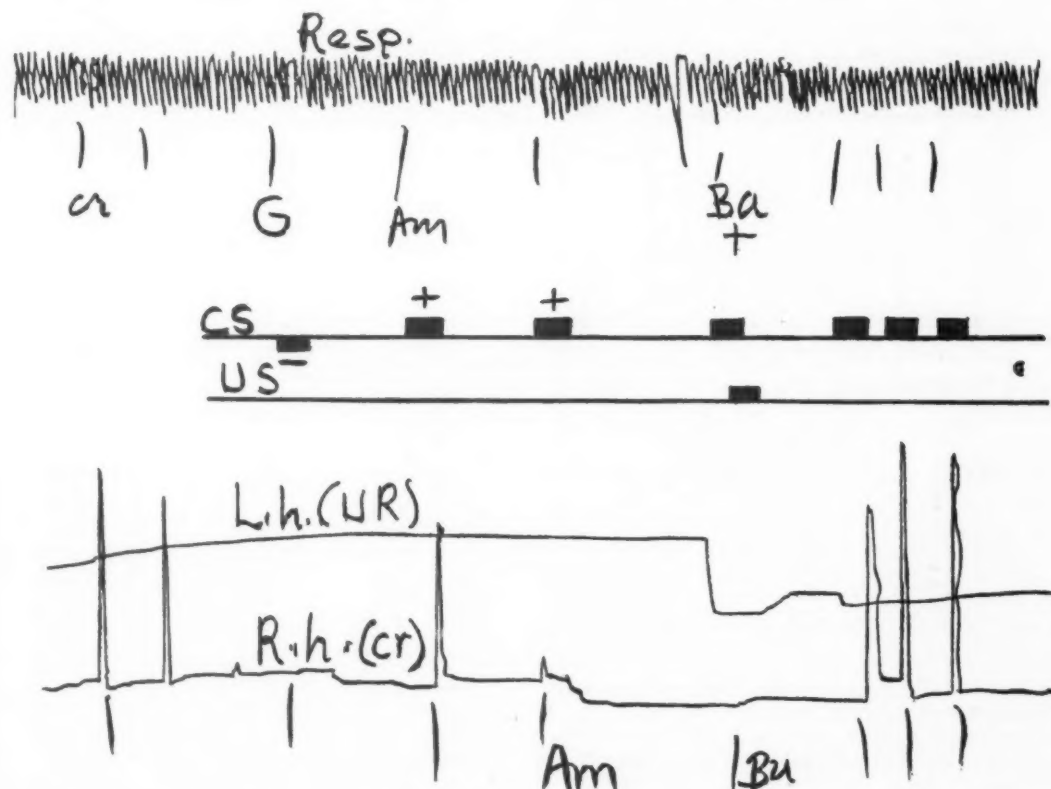


FIG. 10.—Pt. O, 11 January 1939. Normal cr formation without marked disturbance in respiration. Upper line=respiration, middle two lines mark cs and US, next to bottom line is L.h. showing chiefly URs, and bottom line is R.h. showing integrated crs.

Fig. 9
animal

tive conditioned reflexes) are regular and
accurately related to the stimuli.⁸

⁷ A method of testing cortical function and sensi-
tivity of the skin. W. Horsley Gantt. Arch.
Neurol. Psychia., 40: 79-85, July 1938.

Impairment of the function of adaptability as
measured by a simple conditioned reflex test in
certain psychogenic contrasted with organic dis-
eases. W. Horsley Gantt. South. Med. J., 31: 12,
1219-1225, Dec. 1938.

⁸ The following abbreviations are used: cr(s) =
conditioned reflex(es); cs = conditioned stimulus;
US = unconditioned stimulus; UR(s) = uncondi-
tioned reflex(es); l.h. = left hand, i. e., the hand
receiving the US and whose recorded movements
are chiefly URs, though sometimes also primary
(spontaneous) crs; r.h. = right hand, i. e., the

The second patient (S. R.) is a catatonic
whose conditioned reflexes and uncondi-
tioned reflexes were followed during vari-
ous degrees of catalepsy. On October 24,
1938, the patient was able to converse but
showed some rigidity; there is conditioned
reflex in the hand making the purposeful
movements (lower line Fig. 12) which
spreads to involve the other hand (upper
line Fig. 12). On October 31, 1938, there

hand making the purposeful movements to avoid
shock, whose record shows chiefly the secondary
(integrated) crs; positive (excitatory) csi marked
above the line; negative (inhibitory) below the
line.



FIG. 11.—Pt. Eg., 14 January 1939. Hyperactive schizophrenic with anxiety. Note disturbance in respiration and constant irregular movements in both hands connected with inability to differentiate positive from negative signals. Upper line = respiration, middle line = cs, next to bottom line = L.h. showing cr and UR activity, and lower line is R.h. with integrated crs.

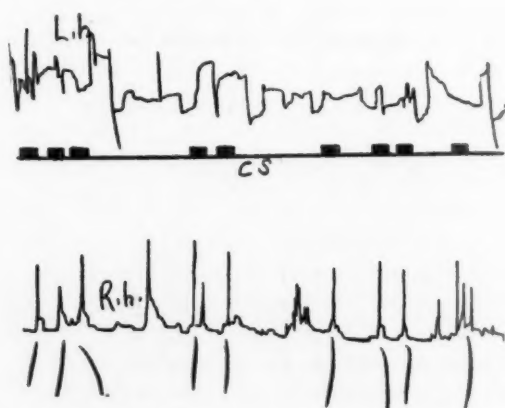


FIG. 12.—Pt. S.R., 24 October 1938. Precataleptic stage. There is successful elaboration of crs but not differentiation (bottom line), tremors indicating tension in the hand receiving the unconditioned stimulus (top line).

was increased tension with ineffective conditioned reflexes—present in both hands—and mutism; the patient had to be brought in a wheel chair (Fig. 13). On January 30, 1939, the patient was able to converse rationally; he formed adequate conditioned reflexes (lower line Fig. 14), there was little spread to the other hand (middle line), and the respiration was only moderately disturbed (upper line). However there was no differentiation between the positive amber light and the negative white light. On March 6 the patient was again cataleptic, very rigid, mute, unable to walk. In Fig. 15 there are no purposeful conditioned reflexes (lower line) but some primitive conditioned reflexes of a non-purposeful character and marked unconditioned reflexes—these oc-

curred only to strong unconditioned stimuli (70 volts faradic current). These changes

limited scope of this paper it is not possible to give a more detailed discussion of the

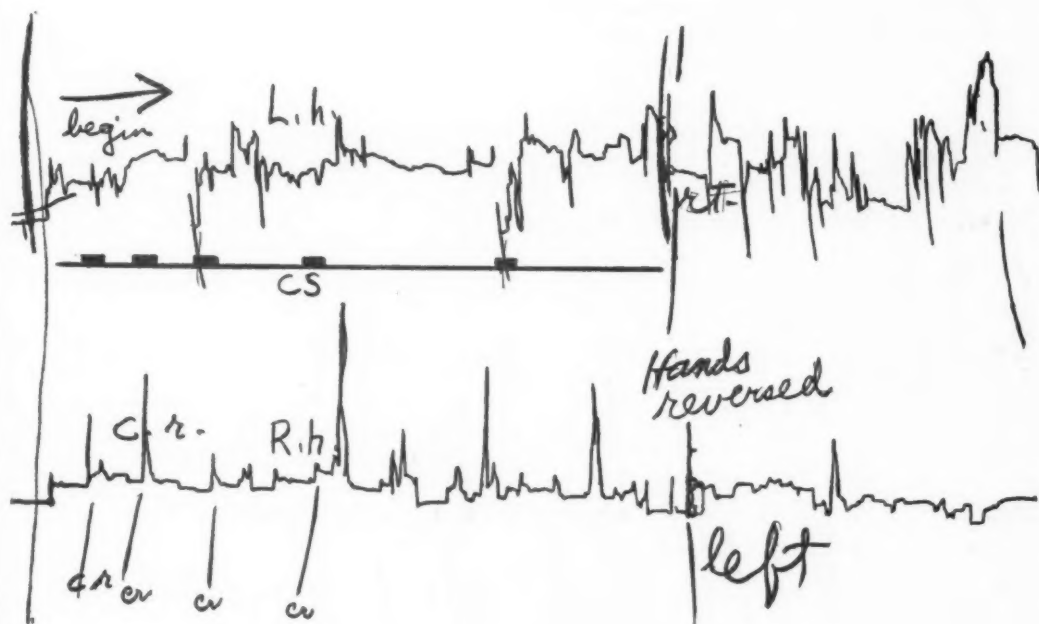


FIG. 13.—Pt. S.R. 31 October 1938. Increased intensity but ineffectual crs.

are seen in the middle line of Fig. 15. The respiration is suppressed and distorted, chiefly abdominal (upper line Fig. 15).

(In the figures the upper line represents the respiration, the middle line both the crs and the URs in the hand receiving the US, and the lower line the purposeful, integrated cr movements).

The records for the three above mentioned patients are sufficient to demonstrate the fact that the changes in the character of the crs bear a close relationship to the clinical condition as well as to the individual patient. First, in the schizophrenic the respiration was less disturbed as he was able to make the differentiation and give the appropriate reactions to the conditional stimuli. Second, it is observable that the cr record is parallel in the catatonic to his clinical condition—when he was able to converse and showed rapport the cr record was nearer normal. Third, the patterns of the three subjects are characteristic. Owing to the

anomalies in the various psychiatric and neurological diseases (*v. Gantt and Gantt and Muncie, supra*).

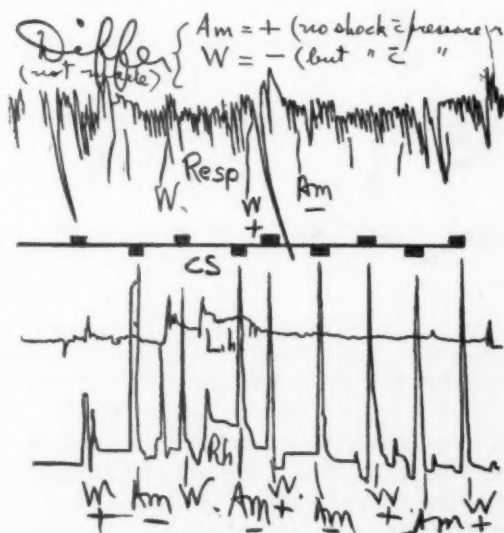


FIG. 14.—Pt. S.R. 30 January 1939. Adequate cr
formation in patient during improvement, but no
differentiation.

III

The above observations reveal a marked difference in many types of measures between stable dogs and humans and certain proven susceptible (labile) dogs and humans.

The significance of this type of data—the examination of function—is an argument for the direct measurement of function rather than prediction of function from structure, for it is function that we are ulti-

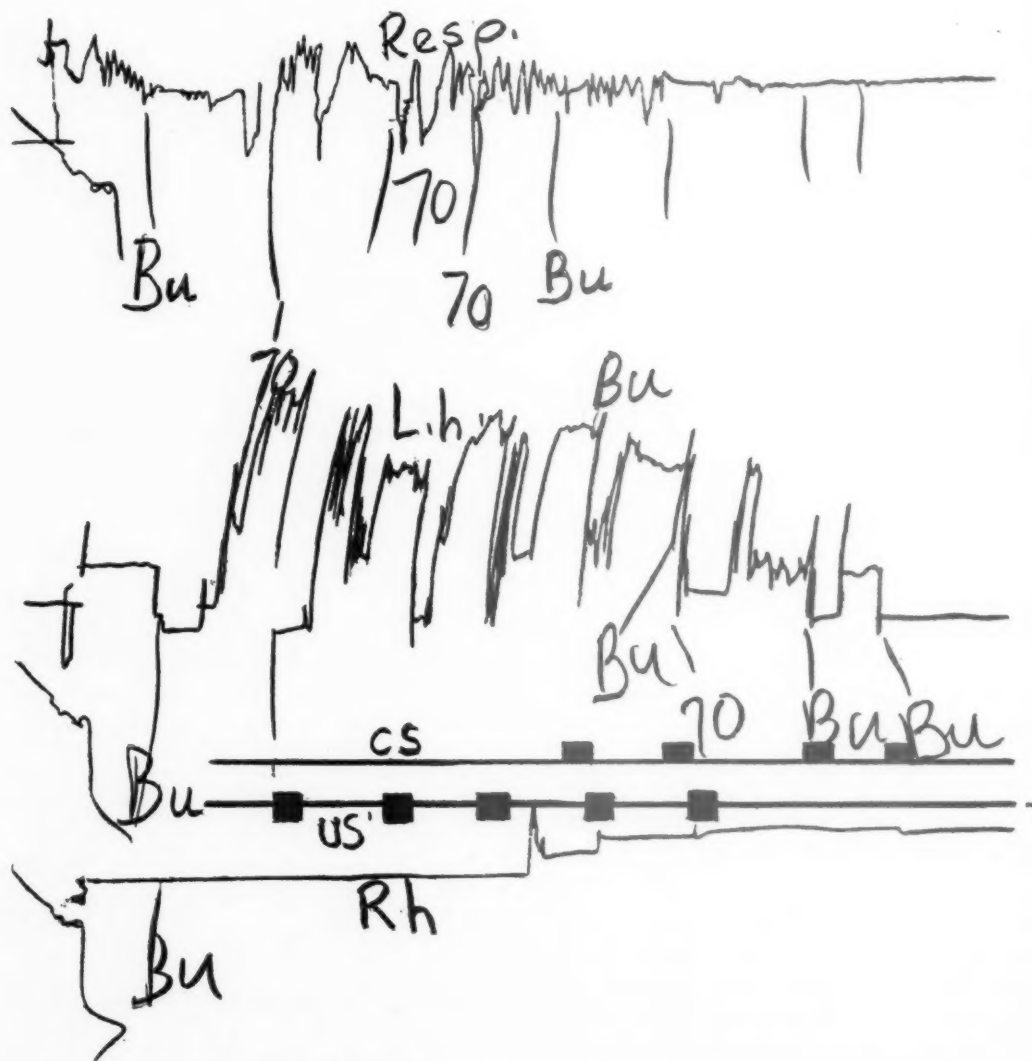


FIG. 15.—Pt. S.R. 6 March 1939. Patient in cataleptic state. Note absence of all cr formation (bottom line), marked tension and irregular movements in hand receiving shock (middle line) (L.h.) and marked irregularity and suppression of respiration (top line).

The method is a functional test that can be readily applied without the aid of language and in the face of only a fair degree of cooperativeness, *e. g.*, in catatonics. A measured strain can be introduced so that the degree of susceptibility may be registered for each individual.

mately concerned with and structure only as it determines or modifies function.

First, are we recording chiefly individual patterns of reactivity or actual susceptibility to the imposed strain? Second, are we measuring only susceptibility of certain physiological systems in the given individuals or

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of the whole personality? For example it is known that one person will break down with a gastric ulcer, another with arteriosclerosis, another with hysterical paralysis under stress and conflict. Third, is the conflict (situation of stress) that we introduce concerned with items that are significant for the human subject or too trivial to be related with the important life experiences?

A satisfactory answer cannot be given to all these objections until further work has been completed. It is undoubtedly true that our tests do concern susceptibility of certain systems dependent upon the type of individual, giving us evidence not only of the susceptibility to breakdown but of the functional type of the individual and the relative susceptibility of the various systems. The question of system susceptibility *vs.* susceptibility of the whole personality requires careful analysis; it should be met by taking several measures that show a high

correlation with the personality rather than by using a single measure.

The question of the significance of the test for the dog can be answered by the fact that many animals show a permanent disturbance lasting for years as a result of the stress of the laboratory procedure and that the symptoms are definitely related to the artificial conflict. Though the test is incomparably less significant for the human subject than his painful life experiences, it nevertheless gives us important information concerning the pattern of reactivity and the susceptibility to an acute temporary disturbance even though the stress is an artificial one. The fact that it is a slight rather than a severe conflict warrants its use in the human being as a direct test of *function* related to the stability of the nervous system, *i. e.*, bearing a direct and close relation to the things about the individual with which we as psychiatrists are most concerned.

WHAT HAS PSYCHIATRY LEARNED DURING PRESENT WAR?

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The average American, now of military age, has been reared under conditions which would have been luxurious in previous generations. The psychological attitude of our people since 1920 was one inclined to pacifism, smugness and self-assurance. This attitude was tinctured by wishful thinking that wars would no longer be necessary to settle international jealousies and national aspirations. Many expected that the United States Army would be composed of "softies," if and when it should become necessary to resort to universal conscription. They have been surprised, for it is the expressed opinion of our military leaders that never in the history of the United States have we had a combat force composed of such high type men as those now in the various theaters of operation. The psychiatric and physical standards laid down by mobilization regulations and utilized by the Selective Service System prior to January 1942, must be commended for this splendid result. For reasons appearing imperative to Selective Service and the War Department, the double screening of registrants under the draft has been replaced by a simple examination by induction boards. It is yet too early to evaluate statistically the results of this change as regards the incidence of mental disorders in the army. Be that as it may, it is a fact that, so far, the incidence of mental disorders has not been as great as we anticipated, when compared with the experience of World War I or of the peace-time army from 1920 to 1938.

We expected that the increased tempo of war, the introduction of new nerve-shattering mechanical instruments of destruction and aerial bombs would greatly increase the incidence of war neurosis, the "shell-shock" of infamous memory. Instead, we have found that the civilians of Spain and of Britain have stood up remarkably well under bombings and that the psychoneurotic centers which were prepared for their reception have been practically deserted. It has been found

that air raids really reduce irrational attitudes and stimulate the war effort and that bombings increase reality feelings in the civilian population. With this experience as a guide we are not now surprised that the same effect is noted in the combat forces. So long as there has remained hope that retaliatory measures could and would be carried out, and so long as danger of death has been shared by all alike, the soldiers of this war have not resorted in large numbers to neurotic forms of escape. So far, it has been more respectable to show that one can take it, than to be labelled a shell-shocked hero.

A great deal of work has been done by military psychiatrists, and by other groups, in determining the elements of deviation from the average normal in soldiers who have proven vulnerable to the military service by developing mental disorders. The conditions present in the service, which are hostile to certain types of individuals, have been adequately described. But there has been little or no work done in or for our army in determining in advance whether a given applicant has the necessary psychological qualifications to become a combat soldier. We are giving him tests routinely to determine his native intelligence and his aptitude for clerical and manual skills, but, so far as I know, no one has presented a workable practical test for stamina, the ability to adjust to unfavorable environments, the aggressiveness and initiative necessary in modern warfare, combined in the proper proportion with subordination to the will of higher military authority and the ability to get along in a group. Until we have such tests or formulas the psychiatrist will be accused from time to time of being overzealous and of rejecting men who many persons believe would make good soldiers.

Certain official studies now under way and not yet released for publication indicate that where two groups were considered, one group being composed of soldiers who were

already hospitalized as psychiatric casualties; the other being composed of an equal number of men who were doing military duty in a manner satisfactory to their unit commanders, both groups being studied and tested by identical methods; in the control and presumably normal group, there was a surprisingly large percentage of the very factors which had been designated as pathognomonic in the casualty group. One group broke down and the other continued to do duty, notwithstanding the presence of some signs and symptoms of psychiatric deviation. One must presume that some members of the control group will break down in the future, if and when the particular stress to which they are vulnerable presents itself. However, the majority will go on through service, some will be minor problem cases and a few will actually be improved by the service.

These studies do not indicate that the army should be converted into an asylum for mental defectives or a clinic for psychoneurotics. I believe they indicate that we must revise our methods if we are to obtain and utilize the man power needed in the present great struggle. Psychiatry must keep abreast of our needs. We must be prepared to go further than we have hitherto gone to give the nation practical psychiatry. Better standards are needed for determining what type of individual will do best in particular kinds of combat and other units.

For the past year at Walter Reed General Hospital we have been making specific inquiry of those patients diagnosed as having psychoneurosis or constitutional psychopathic state in regard to the presence of fifteen specific attributes in their past history. The list follows: (1) Bed wetting beyond four years of age. (2) Thumbsucking or nail biting beyond six years of age. (3) Failure to engage in competitive games involving risk of injury. (4) Tantrums in childhood. (5) Abnormal shyness or sensitiveness. (6) Preference of playing alone. (7) Repeated grades, difficulty with teachers, chronic truancy in school record. (8) Abnormal fears, such as of lightning, dark, bogie man. (9) Shunning of girls after puberty. (10) Faints. (11) Excessive autonomic system reactions to emotion; tremor, abnormal sweat-

ing, tachycardia, etc. (12) Sulkiness under discipline. (13) Abnormal attachment to mother after puberty. (14) Stammering. (15) Obsessional traits.

Our studies are not yet ready for statistical evaluation, but we believe that the presence of four significant traits is not uncommon in individuals who have not become serious military problems, but the presence of six or more should cause one to prognosticate a probable breakdown under stress. This is in general agreement with R. D. Gillespie's experience with a similar table of traits used in the Royal Air Force in Great Britain.¹ In a recent follow-up study of soldiers who had been diagnosed neurotics and who had been returned to duty, Lewis and Slater² found that 74 per cent of those remaining on duty had three or less of the ominous attributes which they had listed. They concluded that the fewer of these attributes a patient has the greater the likelihood of his return to a duty status. A United States naval medical officer³ observes that certain men who have obvious anxiety states, conversions mechanisms, hypochondriacal trends and other personality deviations nevertheless are successful in military aviation. He remarks that flying is the symbolic solution of some neurotic conflicts.

It is my belief that each candidate for commission and each inductee should be investigated for specific traits of character and temperament, based on life history as disclosed by the examinee and on whatever independent information is available. Emphasis should be placed on traits which are favorable for military service, for example, aggressiveness, hatred for the enemy, subordination to and respect for higher authority (civil or military), love of blood sports, proven ability of living and working with other people, non-dependence on any one individual or group, spirit of adventure, zest for competition, adaptability to new surroundings, and certain other attributes. The psychiatrist would do well to evaluate such traits in picking soldiers or officer ma-

¹ Informal discussion before official government group in Washington, D. C., 1942.

² Lewis, A., and Slater, E. *Lancet*, 242: 96-98, April 25, 1942.

³ Bigelow, R. *War Med.*, III: 381, May 1942.

terial and not devote all his energies to the detection of abnormal traits. A preponderance of desirable traits will outweigh undesirable ones, unless the undesirable ones are present in significantly large numbers.

A German admiral said in 1936, "The selection of men qualified to become leaders . . . must occupy first place among all measures taken by the state to insure the maximum development of our people's fighting spirit and striking power."⁴ The Nazis have used every available psychological technique to insure the selection of officers and non-commissioned officers with the qualifications of reliability, adaptability, leadership, and, above all, the fighting spirit—the will to kill when necessary. Military psychiatrists can and must contribute more to the selection of leadership material.

Psychiatric methods can do much in increasing the efficiency of the young officer and soldier. Imperative is the inculcation of the doctrine of aggressiveness into combat units and the knowledge that in the present war we are fighting a ruthless enemy, who, unless he is first killed, will certainly kill, after possibly practicing illegal cruelties. The soldier must be taught not to belittle the ability, courage and equipment of the enemy. He must be taught that this is a war of national salvation and that he must do that which is laid upon him to do. If he fails, he will lose his self-respect, and his family and his native institutions will be placed in jeopardy. I believe that the members of our armed forces are being thus properly indoctrinated and that the result will be a far smaller incidence of neurosis than we experienced in the previous war. However, in this global conflict one cannot predict the places or circumstances under which our forces will have to fight and new factors may be introduced which will nullify our optimism.

Notwithstanding our need for man power, exemplified by the recently announced decision of Selective Service to reclassify all Class 1B men and to dip into other deferred classes, there are certain mental deviants who should be sorted out at the first echelon.

⁴ Hansen. Quoted in German Psychological Warfare, page 19, Comm. for Nat. Morale, New York, 1941.

I will mention some of them. The outstanding characteristic of the schizophrenic is that he exhausts himself with the intricacies of his interpersonal relationships.⁵ The living conditions and need for close and sympathetic cooperation with his fellow soldiers renders the army a rather poor place for the average schizophrenic person to live and work. Notwithstanding the fact that we have known of an occasional simple schizophrenic who has survived two or three enlistments in the peace-time army without exhibiting too obvious deviation, we do not advocate the acceptance of schizophrenics or markedly schizoid individuals. So long as the duties of such an individual remain comparatively static and routine and so long as a sympathetic superior remains in command, he may carry on and be benefited by the protection which the service affords. However, when war comes or changes in organization occur, he becomes a mental liability.

There has been much criticism from time to time by my civilian medical friends because we have been adamant in resisting the temptation to accept, as officers or enlisted men, some well educated and commercially successful men who have had a definite manic-depressive psychosis with complete remission for a period of years. We believe that such a cyclothymic individual has profited by the experience of his mental illness and that he has knowingly and intelligently avoided the stress which precipitated the first breakdown or, if not avoidable, he has used the psychotherapy which contributed to his recovery, in making the necessary psychological adjustments in time to prevent a complete rupture. The exigencies and demands of the military service upon the individual in war time are such that stresses to which he is vulnerable cannot be avoided without interfering with training, necessary duties or combat necessities. So the manic-depressive in remission is too great a potential risk. The greatest problem of all is the hypomanic type of man who is personable, attractive, gregarious, and usually quite successful in civil life. He talks his way out of difficulties and over almost all objections to his conduct. He sounds plausible and his patriotic zeal to become an officer in the army

⁵ Bartemeier, L. War Med., 1: 675, Sept. 1941.

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is almost convincing. However, we know that such an individual will resent the frustrations and disappointments incident to proper placement and functioning within a military unit where close cooperation is necessary. He will resent the necessity of subordinating his own desires and of patiently waiting for the right moment to carry out his plans for the betterment of the service.

The epileptic, who has had fits on and off since early childhood, has grown to regard himself as a person set apart. He has continuously been on guard against situations which might result in physical harm to himself. Perhaps he has gone for a considerable time without a convulsive attack. He wants to prove himself to be like other men. He is doubly anxious to get into military service because he is led to believe that the "regular life of a soldier" will prove of therapeutic value. He becomes what has been termed "a negative malingerer." It is our experience that the epileptics are notorious in concealing their disability at time of induction or recruitment. But it requires no military experience to convince one that the army is no place for a person who has even occasional lapses of consciousness, no matter what the etiology may be. The risk to the individual and to the security of large units may be jeopardized by such an incident. Some "fitters" are able to control their seizures by the judicious use of anti-convulsant remedies, but there usually comes a time in the life of a war-time soldier when it is no longer possible to obtain such remedies. Then he relapses with a vengeance. The tradition that Napoleon Bonaparte and Alexander and certain other military geniuses were epileptics does not vitiate the argument.

Most of us have had experiences with the mentally-deficient individual who is faithful, loyal and kind and who has fully served our need of a hewer of wood and drawer of water. Each military unit has a need for some such men and in a peace-time establishment or in a war-time "housekeeping" unit, a considerable number of borderline mental defectives may be used to advantage. Zabriskie⁶ recalls how a feeble-minded sol-

dier with a mental age of seven years turned out to be the company hero in one action in World War I, because he succeeded in getting food, water and messages through the enemy lines to his outfit where all others failed. However, we find enough borderline cases who have been passed by the induction board to fill all our needs and the supply is so adequate that it is actually necessary to separate the surplus from the military service. The acceptance of men with a mental age of less than ten years is not advocated, because the vast majority of the army must be composed of clear thinking, intelligent and adequate soldiers.

History teaches that certain military disasters were attributable to the fact that the commanders were paretics. In these days of routine serological and other tests for syphilis such a situation is unthinkable. There is an incidence of neurosyphilis in the army, although it is much smaller than in the same age group in civil life. This condition is treated aggressively whenever found and the time spent in hospital under specific and nonspecific therapy is so great that the acceptance of any person with neurosyphilis is not recommended.

The psychopath, whether we consider him as a constitutionally inferior individual whose genes are responsible for his defective character; or whether we blame the lack of proper habit training and self-discipline; or whether we think of him as just a willfully "cussed" nuisance; the fact is that his class forms the largest group of mental deviants with which the army has to deal. Without an elaborate discussion as to diagnostic classifications, I may say that long practice in the military service has led me to insist upon the following criteria being present before approving a diagnosis of constitutional psychopathic state: (1) An adequate social service history showing a failure to conform to the customs, laws or standards of the culture-group to which he belonged in civil life. (2) A statement from his organization commander showing repeated breaches of discipline or non-conformity to the standards set and maintained by the other men of his unit. (3) Hospital or other medical observation and examinations, the results of which are consistent with the history ob-

⁶ Zabriskie. *Psychosomatic Med.*, 3:295, July 1941.

tained from other sources. (4) The elimination of psychosis, psychoneurosis, mental deficiency or other reasonable explanation for the behavior of the soldier.

Some psychopathic individuals never succeed in being fitted into the military scheme. Their nuisance value is high. They take more of the time and energies of company non-commissioned officers, unit commanders and medical officers than their services deserve. However, there is frequently the feeling that the psychopath attempts to evade duty by artful dodges and by wilful insubordination. The temptation is strong to compel him to do military duty at whatever cost. Discipline, change of duties and personal counsel are sometimes successful in correcting the faults. However, under the exigencies of military service, it is more often necessary to discharge such a man because his nuisance value outweighs his virtues. Some aggressive psychopaths find an outlet for their anti-social feelings in action against the enemy and do well in combat organizations. The inadequate passive types are not apt to do well in the army because of their inability to make the personal adjustments necessary to comfortable group life. The sexual invert gets along well and is no problem so long as he is discreet. If not, he becomes a social pariah to the other men and the very fact that he is a known homosexual reflects in his efficiency record, and antagonistic attitudes often precipitate mental crises of various kinds. There is no problem confronting the military psychiatrist that calls for more kindly, tolerant, scientific understanding than in the field of the sexual psychopath.

It is a fact well known to military psychiatrists, that the incidence of psychosomatic symptoms and psychoneurotic syndromes, especially of the neurasthenic and anxiety types is greatest under conditions such as retreats before a persistent ruthless enemy, where food deficiency, loss of sleep, hopelessness and insecurity are present. It is fair to state that to the present, the incidence of peptic ulcer and allied conditions has not become a problem of great importance in the United States Army. One is tempted to believe that the stressing of the importance of psychosomatic syndromes in

Selective Service literature⁷ and in Army Regulations⁸ has borne dividends in the rejection of many registrants who would have become casualties in the military service. When the need for man power forces us to dip further into the substandard physical categories, it may be expected that this type, as well as other types of military disabilities will increase. In the occasional cases, especially of officers, who have found that service in the army has brought about more frustration and anxiety than they could bear, and hospitalization has become necessary, it is remarkable that most of them have felt ashamed of their lapses and have begged to be returned to active duty in order that they might redeem their self-respect and self-confidence.

The mission of the military psychiatrist is not only to select out the mentally unfit and to care for those who have developed a mental disorder and to eliminate them from the service, but he has the capacity and training, as yet not fully utilized in our army, to contribute to the mental health and morale of the soldiers by the use of clinics, similar to non-military mental hygiene clinics, to which the soldier or officer in need of help in the early stages of mal-adaptation to military life may bring his problems for discussion and assistance.⁹ By pointing the way to a healthy adult-type of adjustment, by the use of permissible compromises, and with the assistance of the American Red Cross, the military chaplain and the Special Services Branch, many incipient mental disorders may be averted and total disability prevented. Preventive medicine occupies an important position in the army. Military psychiatry has been too much occupied by the selecting out of the mentally unfit and of their orderly separation from the service. Dividends will be paid by the application of the principles of mental hygiene to the individual soldier. This will require the services of the psychiatrist actually with troops. It has not been considered expedient to provide

⁷ Medical Cir. No. 1, S. S. S., 1941.

⁸ Mobilization Regulations 1-9, par. 93 d (2).

⁹ This article was prepared in September, 1942. Since that time consultation clinics have been started in several replacement training centers, U. S. Army.

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for Division Psychiatrists as in 1917-18, because of many changes in military organization since that period which make such a position impracticable, but the provision¹⁰ for the formation of special training units for the instruction of enlisted men, who are not immediately suited to assimilate successfully the regular course of training to be a soldier or who are emotionally unstable to a degree that prevents their ready adjustment to the normal military program, is a substitute method of handling mild cases of mental deviation. The assistance of psychiatrists is contemplated in the operation of these units. When an army psychiatrist's recommendations are repeatedly disapproved by higher authority, that officer has failed to sell his utilitarian value and he has failed to adapt himself to the institution within which he must work. His ability to sell practical psychiatry to unit commanders will measure his fitness as a mental hygienist in contradistinction to his function on the induction board or in the hospital.

In the presence of a conflict laden with emotional values, an individual may attempt a solution in an aggressive manner or he may bend before the fury of the conflict hoping that it will pass over him with minimal damage or he may retreat to a psychologically safe place and try to ignore it. Too long we as a people have used the latter methods. The time for an aggressive offensive type of thinking is here. The psychiatrist shares in the responsibility for the thoughts and ideals of the people and due to his peculiar type of training and his mastery of psychological technics he should be a leader. His opportunity in the civilian field is great in this crisis.

¹⁰ Army Regulations 615-28, May 28, 1942.

Each of us hears complaints from our medical colleagues who have left civil practice to become medical officers in the armed forces. They say that they are performing duties foreign to their medical training, that there is no clinical medicine to be learned in the army. Let me quote from an editorial in the *British Medical Journal* recently:¹¹ "What is the proper name for keeping a thousand men fit? How can it be said that a doctor learns nothing in the Forces—unless he has lost the power to learn? Professional knowledge is not enough to make a first class army doctor. He must know how to prevent disease, how to maintain the morale of troops, how to evacuate and treat the wounded quickly. On the professional side, where can he get a quicker grasp of the slighter forms of sickness, which with the increasing emphasis on prevention, must come to fill a larger and larger part in clinical medicine? It is a serious criticism of medical education if it has taught us that the only things worth learning are further details about pathological lesions and therapeutics. And there is another item on the balance sheet. To see the world, to meet men outside his own profession and his own upbringing, with different trainings and other aims in life: these are a form of education as valuable as years of hospital appointments. Most doctors now passing out of middle age will agree that the experience they gained in the last war left them better doctors than they could have been without it." To that I would like to add my opinion that the specialist will be better able to practice his specialty in the army after he has had some experience in a line organization with the duty-soldier and his problems.

¹¹ Editorial: *British Medical Journal*, 1: 13, July 4, 1942.

SOMATO-PSYCHIC DISORDERS OF OLD AGE¹

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INTRODUCTION

The increasing hospitalization of persons suffering from senile and arteriosclerotic mental disease¹ lays on the medical profession a pressing obligation to study preventive and remedial measures by every means within its power. The purposes of this contribution are to examine the admission rates of patients in these categories at the Philadelphia General Hospital and the Pennsylvania Hospital and to report a study of such patients at the Pennsylvania Hospital, Department for Mental and Nervous Diseases. We shall discuss the early signs or prodromes warning of impending breakdown, and attempt to weigh the relative values of contributory and precipitating factors, to trace the course of cases diagnosed as senile and arteriosclerotic dementia, to evaluate treatment methods and, if possible, to formulate some thoughts as to preventive measures.

The first published treatise on the medical problems of old age was contributed by Constatt just one hundred years ago. Other authors dealing with this subject were Geist, Fordell, McLachlan and Charcot, and in 1909 Nascher coined the term "geriatrics" to define that branch of medicine which specialized in the ailments of the aged. Until the past few years very little had been written about the old-age mental disorders which did not declare their hopelessness.

Vital statistics show that with the improvement in life expectancy in recent years a corresponding increase has occurred in the proportion of old persons in our population. Statistics show also that for persons who have attained the age of forty, life expectancy has not materially improved. Therefore, though much has been accomplished in lowering the mortality rates in childhood

and youth, it appears that little has been done in this direction among the later age groups.

Recent tabulations from the records of the Pennsylvania Hospital and the Philadelphia General Hospital show that an average of about 24 per cent of patients admitted to the psychopathic departments of these institutions belong in the old age brackets. Whether this percentage represents an increase in the actual incidence of mental disease in elderly persons, or merely makes it more noticeable on account of the increased proportion of such persons in our present population, cannot be ascertained because of the meagerness of statistics from the past. Abundant data are available, however, to show that hospitalization of old age psychoses has increased greatly in recent years, and is continuing to increase. The accompanying tabulation of admissions to the Pennsylvania Hospital, Department for Mental and Nervous Diseases, further corroborates a number of statistical statements affirming this increase. The recent rate of admissions of old age psychoses to the Philadelphia General Hospital is approximately 25 per cent of more than 16,000 mental cases admitted.

A comparison of admission rates of persons over 60 years of age to the Pennsylvania Hospital, Department for Mental and Nervous Diseases, over a hundred year span is of interest.

Although the 24 per cent ratio obtained by averaging percentages of the Pennsylvania and Philadelphia General Hospitals cannot be applied to the age groups of actual hospital populations, since senescent patients have short life expectancy and their average hospital sojourn is self-limited, still the admission rates are sufficiently impressive to call for reconsideration by psychiatrists of the importance of old age psychoses and of the need of studying measures for their prevention and amelioration. From the economic standpoint alone, a heavy burden is

¹ From the Institute and the Department for Mental and Nervous Diseases of the Pennsylvania Hospital and the Department of Psychiatry, Woman's Medical College of Pennsylvania.

placed on our hospital facilities and national resources by the need of caring for this ever increasing segment of our population.

CLINICAL MATERIAL

All cases of senile and arteriosclerotic psychoses admitted to the Pennsylvania Hospital during a ten-year period, 1930-1939 inclusive, (123 cases) were studied. These cases were diagnosed at staff conferences as

psychosis with cerebral arteriosclerosis, and 7 as senile psychosis. The 26 patients socially recovered and the 4 "much improved," after discharge from the hospital were able to maintain their restored status, as shown by follow-up records. For completeness, and with the purpose of arriving at some prognostic criteria, these 30 recovered cases were studied in comparison with 30 unrecovered cases. The 30 unrecovered all went on in an uninterrupted course to further de-

TABLE I

COMPARISON OF ADMISSION RATES OF SENILE AND ARTERIOSCLEROTIC PSYCHOSES WITH SCHIZOPHRENIA PSYCHOSES AT THE PHILADELPHIA GENERAL HOSPITAL, 1925-1939

Year	No. of senile psychoses and psychoses with cerebral arteriosclerosis	Per cent of total admissions	No. of cases of schizophrenia	Per cent excess of old age psychoses over schizophrenia
1925.....	667	20	...	..
1929.....	804	25	462	74
1930.....	998	27	601	64
1933.....	693	24	545	25
1936.....	527 *	23	354	50
1939.....	589	20.4	523	11

Average per cent of total admissions 1925-1939 of senile psychosis and psychosis with cerebral arteriosclerosis 24.8

Average excess of senile and arteriosclerotic admissions over schizophrenia admissions 44.8

* Statistics in 1936 available only for patients committed (1585 total) to state mental institutions from Philadelphia General Hospital.

senile or arteriosclerotic psychoses, after three to four weeks of hospitalization and general treatment and observation. In this way transient aberrations caused by alcoholism, trauma, delirium, congestive heart failure and transient toxic and infectious states

cline and dementia. None was included who did not live long enough to make valid the comparative data.

In the 30 recovered patients the average age was 67 years, the psychosis had had an average duration of 11.6 months before hospitalization, and the average duration of hospitalization was 4 months. The fact that all these patients were committed to a mental hospital gives an authoritative expression of the severity of the psychosis. These data are tabulated in Table III.

CASE I.—Among the 30 recovered cases, one of complicated senile dementia was that of a well-to-do business man committed to the Pennsylvania Hospital at the age of 72. The history given by his guardian indicated that for one year before admission he had been mentally confused, had delusions of persecution and had made improper advances towards women. He had removed \$700,000 in securities from the vaults of his bank and had hidden them in various places of concealment in his house, in the belief that the bank intended to steal them. He kept a loaded pistol under his pillow as a protection against thieves and his "enemies."

TABLE II

HUNDRED YEAR COMPARISON OF ADMISSION RATES OF PATIENTS OVER SIXTY YEARS OF AGE AT THE PENNSYLVANIA HOSPITAL

	Total admissions	Over 60 yrs. of age	Per cent
Years 1829-1832.....	394	18	4.5
Years 1929-1932.....	1037	151	14.5

were eliminated. Quite in disagreement with the generally accepted hopelessness of old age psychoses, it was found that 30 (or 24.4 per cent) made a social recovery, or were much improved and able to live at home, making a fairly satisfactory adjustment. Twenty-three of the 30 were diagnosed as

He had auditory hallucinations at night, overhearing plots to murder him for his possessions. He called the police on a dozen or more occasions, often at night, complaining that men were creeping through the shrubbery towards the house. On one occasion he fired his pistol at a passer-by and this act resulted in his commitment. After admission it was learned that for a number of years he had restricted his diet to stewed chicken and rice, hot biscuits, tea and toast. He suffered from intermittent attacks of enteritis and had lost 21 pounds in weight. The R. B. C. was 3,320,000, hemoglobin 64 per cent, and the skin manifestations of early pellagra were present. The blood pressure averaged 104/70, there was moderate sclerosis of peripheral vessels, the heart tones were muffled, and there was slight edema of the feet and ankles. There was definite dehydration. After three weeks of hospital treatment the patient presented a mental picture essentially unchanged and the diagnosis of senile

former dress designer, who was committed to the Pennsylvania Hospital in 1934. The history showed that for 18 months before admission she had complained that her neighbors were operating an electric machine as part of a plot to drive her crazy by keeping her awake at night. She stated that she was the only person who could hear this machine because it was instantly shut off when another person listened. She stated that the neighbors were insane and were determined to injure her. She frequently screamed "Fire!" from the windows of her home, and pounded on the wall to attract the attention of the police, so that they might arrest the plotting neighbors. In this way she made a disturbance through the night into the early morning hours. During this 18 months' period she had frequent spells of arteriosclerotic vertigo and had fallen a number of times. She was committed on the application of her neighbors, with the approval of her family. In the hospital she was

TABLE III

Clinical material for 10-year period 1930-1939 inclusive, 123 cases		COMPARATIVE DATA	
		Recov- ered (30)	Unrecov- ered (30)
Remission or social recovery (30), 24.4%			
Psychosis with arteriosclerosis.....	23	7	20
Senile psychosis	7	23	10
		67	67
Precipitating factors			
30 Recovered			
Physical	20	4 mos.	7 mos.
Psychological	5		
Combination	5		
30 Unrecovered			
Physical	8	11½ mos.	16 mos.
Psychological	12		
Combination	10		
		Cardiac decompensation	5
		Cerebral thrombosis at onset	
		of symptoms	8
		B.U.N. over 15 mg. per cent.	15
		Chronic nephritis	22
		Hypertensive cardiovascular	
		disease	30
		Dehydration and weight loss.	24
			8
			5

dementia was made. Intensive detoxification was begun with colonic irrigations twice weekly and one quart daily of acidophilous milk. In addition he received vitamin B complex syrup, 2 ounces daily, nicotinic acid, 50 mg. three times a day after meals, cod liver oil, one tablespoonful a day, vitamin C, 100 mg. daily, and thiamin chloride, 30 mg. daily, by intramuscular injection. General daily massage and abundant fluids were given and a diet of 3000 calories rich in vitamins was in effect. No sedatives were required. The patient was kept in bed for about one month and at the end of that time he became very cooperative and followed a program of gradually increasing exercise. After four months there was sufficient improvement to permit a stay at a resort hotel with a nurse-secretary, and six months after his admission he was discharged from the hospital and the guardianship dissolved. A follow-up five years after discharge indicated that he was entirely well.

CASE 2.—A recovered case of complicated arteriosclerotic psychosis was that of a woman of 69, a

confused and garrulous, and still terrified of her neighbors, who she said had brought about her commitment by a "frame-up." She gave dramatic imitations of their actions, and was agitated and suspicious, with periods of excitement and profound confusion. She developed paranoid delusions of persecution about persons in the hospital. The physical findings showed blood pressure of 180/128, apical systolic heart murmur, rapid irregular pulse, tremor of the arms, hands, tongue and face, diminished patellar reflexes, advanced sclerosis of retinal and peripheral arteries, and some stammering and thickness of speech. There was also a tendency to uncontrolled laughter resembling that of pseudo bulbar palsy. Constipation and a moderate degree of arthritis were also present. The R. B. C. was 3,850,000 and the hemoglobin was 78 per cent. Urinalysis showed strongly positive albumin and many hyalin casts. During hospitalization there were two spells of arteriosclerotic vertigo with unconsciousness, irregular pulse and muffled heart tones. Digitalis was given in gradually increasing doses until the patient was digitalized. The heart

action improved and the blood pressure became stabilized at 160/100. A high calory, high vitamin and laxative diet was given and vitamin concentrates in the form of six haliver oil and viosterol capsules daily and twelve yeast tablets daily were prescribed. Colonic irrigations were given once a week and cascara and a preparation of agar and mineral oil were used as laxatives. No sedatives were needed. After four weeks in the hospital there was no mental improvement and the case was diagnosed as psychosis with cerebral arteriosclerosis. The patient improved slowly and after nine months' hospitalization was able to go to a convalescent home where she remained for four months, before returning to her own home. A follow-up report four years later indicated that she was entirely well.

ETIOLOGY

The most frequent causes of mental breakdown in aged persons are generally known to be arteriosclerosis and the degenerative process which produces senile dementia. Thrombosis of a cerebral blood vessel frequently initiates the psychosis due to arteriosclerosis by causing direct physical damage to the brain. Manic-depressive psychosis and late involutional melancholia may also occur in old age, and offer a poorer prognosis in this period than in earlier life. Congestive heart failure, kidney disease, anemias, pulmonary congestion, depleting enteritis and toxic states caused by infections of the teeth, sinuses, tonsils, gall bladder and prostate gland or cervix, have been found to be contributing factors to mental failure. In addition, exogenous toxic states caused by chemical poisoning, or the use of alcohol or sedative drugs, especially bromides, have appeared associated with mental breakdown. In many instances (not included in this study) mental symptoms in aged patients were found to have been produced by the drugs themselves, and not by the conditions they were intended to alleviate.

Other states found in this study to contribute to mental breakdown were malnutrition, avitaminosis and dehydration, caused by the frequent tendency of elderly persons to restrict their diet and intake of liquids, and to avoid fresh air and sunshine; also various forms of toxemia, extreme fatigue, inadequate sleep and constipation. No case here reported was caused exclusively by such chronic conditions, which in most cases were correctible. Multiple causation was the rule

rather than the exception, and diagnosis and prognosis were complicated by the wealth of contributing factors.

In some cases psychological or emotional stress was the apparent precipitating agency. The loss of a spouse, a child, a home, financial security or independence, was the visible signal for the onset of mental collapse. In considering such cases it was borne in mind that these forms of distress are unfortunately widespread among aging persons. For example, it can be calculated readily from vital statistics that to be widowed is the lot of hundreds of thousands of elderly persons annually. From the proportionately small percentage of senile psychoses diagnosed as of psychological origin, it will be seen that emotional blows of this kind, and other distressing situations mentioned, are well withstood by the great bulk of our elderly population. It may be concluded that such common experiences of old age are not in themselves sufficient to cause mental breakdown. When psychogenic factors appear to be causative some somatic defect or disorder is usually present which renders the person peculiarly unable to resist psychological strain.

Unknown causes must be held to play an important part in the etiology of senile psychoses. A frequent finding in the routine autopsies done in elderly cases is the presence of large masses of softened or destroyed tissue in the brain resulting from cerebral thrombosis and advanced arteriosclerosis, but in the clinical records there is no evidence of psychotic breakdown. This would seem to indicate that the organic destruction of tissue in the nervous system is not always in itself a causative factor in the psychoses of the aged. It is unlikely that more than a fifth of the persons with cerebral thrombosis or advanced arteriosclerosis experience resulting mental breakdown. The deciding factor may be an inherited tendency, the element of chance in the location of lesions or additional unsuspected pathogenic agencies.

The rôle of heredity in the etiology of old age psychoses is important and will be discussed in a future paper.

PRODROMAL SYMPTOMATOLOGY

Certain mental changes occurring almost universally in old age are weakening of initi-

ative, restriction of interests, alteration of regular sleep habits, impairment of inhibitory control and defects of memory, comprehension and responsiveness. Such changes appearing in moderation are not significant, and may be regarded as manifestations of the normal process of aging. It is only when these changes become exaggerated that they take on pathological meaning and constitute the prodromal symptomatology of mental breakdown. Early recognition of this symptomatology by the physician is important for the safe-guarding of the patient, his family and resources.

Study of 123 cases admitted to the Pennsylvania Hospital and 17 in the out-patient service indicates that the prodromal stages of senile and arteriosclerotic psychoses have consistent patterns which resemble each other so closely in the two disorders that for purposes of early diagnosis it is convenient to consider them as one.

In the majority of cases a neurasthenia-like syndrome characterized by complaints of weakness, malaise, insomnia and nervousness had existed for six months to one year prior to the mental breakdown. Irritability was a common symptom noted by relatives. General practitioners usually saw the earliest manifestations, and frequently these appeared in the convalescence from minor illnesses, such as colds, grippe, "flu," etc., which were followed not only by the mental confusion and unstable emotionalism frequently ensuing on the physical illness, but also by what seemed to be a permanent change in the personality structure. In many instances patients suddenly exhibited traits foreign to their earlier personalities, or showed marked increase of certain minor character defects which during a long life had remained submerged. Henderson and Gillespie state that "there is not so much a change of personality as a caricature of it." Thus a lifelong trait of saving and caution in financial matters may become exaggerated to the point of miserly hoarding of useless scraps and trinkets and extreme penuriousness. A mild distrust of others and hypersensitiveness may develop into troublesome suspiciousness, delusions of persecution with threats of retaliation, or actual resort to legal prosecution. Old, buried ill-feeling and

grudges may become ignited and inflame the patient to attempts to do bodily harm, or to make ill-advised complaints to neighbors, friends or the police. Inhibitory control may be seriously diminished, and formerly repressed asocial or anti-social tendencies permitted to obtrude. Transient sexual interest may lead to impropriety of conduct. Normal sympathy and regard for the feelings and opinions of others are often lacking, and extreme emotional lability with undue sentimentality and lavish, injudicious charities may occur. It is in this prodromal stage that patients become liable to contract sudden, unsuitable marriages, or to execute a succession of new wills, which may be increasingly unnatural and subject to contest in court.

Serious memory defects are frequently an early sign of senile change, and are possible sources of danger to both the patient and his family. The patient may wander away and become lost or injured; he may turn on a gas burner and forget to light it, or a water faucet and forget to turn it off or carelessly put down a lighted match. Such patients sometimes throw money into the waste basket or the fire. Insomnia of abnormal severity and inconsiderate and noisy nocturnal restlessness may indicate the onset of mental failure.

Following the prodromal stage, senile dementia takes the form of gradual mental deterioration without characteristic acute neurological symptoms. Psychosis with arteriosclerosis may follow a similar course, but more often is marked by the onset of some neurological disorder caused usually by cerebral vascular insult. The commonest symptoms are an apoplectiform seizure of major or minor character, and the development of characteristic mental changes dating from this seizure. These subsequent mental symptoms may develop acutely, or may be, in the earliest stages, little more than an awareness on the part of the patient that he tires more quickly, that sustained mental effort is impossible and that initiative, self-assurance and powers of comprehension are diminished. Memory defects, emotional instability and outbursts of unreasonable anger are increased. Such aggravated mental symptoms appear as a rule in conjunction with

tremors of the hands and face, confused thick speech, head noises, vertigo, generalized weakness and unsteady gait. The later symptoms of senile dementia and arteriosclerotic psychosis are well known and need not be discussed here.

TREATMENT

In our series of 123 hospitalized cases all were given the same basic treatment, designed primarily to improve both the quantity and quality of the blood supply of the brain, by increasing the efficiency of the general circulation and by correcting nutritional defects, avitaminosis, dehydration, toxemia, glandular deficiencies and the general sluggishness of body functions resulting from sedentary living and lack of fresh air and sunshine. The general rules aimed at the correction or prevention of nervous and mental disorders in the aged may be outlined as follows:

1. *Removal of sources of infection*, such as diseased teeth and tonsils, when this is possible, and treatment of such sources by less drastic methods when removal is impossible, so that toxemia resulting from infection may be reduced to a minimum. Vaccine treatment of infection and its consequences, not used in this study, offers promise in cases where the foci of infection are not removable. Extremely small vaccine dosage is advisable for elderly patients.

2. *Correction of constipation* is imperative, since this is a chronic disorder among the aged. Stasis of bowel function may reach the point of focal infection and examination of every patient for such conditions is important. In our series of cases mild laxatives and various combinations of mineral oil and agar were used, and in a number of severe cases of chronic constipation with toxic absorption high enemas and colonic irrigations were found to be necessary.

3. *Administration of a high caloric, high vitamin diet* is a requisite. In some of our cases tube feedings were resorted to because of lack of cooperation. Additional vitamins are essential and may be given in the form of fruit juices and daily doses of two tablespoons of cod liver oil and six yeast cakes. Vitamin B concentrates in the fractionated form are recommended, the average daily

dose in severe cases of malnutrition being 30 mgs. of thiamin chloride by intramuscular injection, and daily oral administration of 75 mgs. of nicotinic acid and one ounce of vitamin B complex syrup.

4. *Administration of abundant fluids* is advisable except where kidney disease, cardiac decompensation or other forms of circulatory embarrassment are specific contraindications. A simple routine is to give between-meal feedings of egg-nog, malted milk or fruit juice, for the purpose of supplying both nutritional and fluid needs. Dehydration is a very common finding in the general medical examination of elderly persons, and in severe cases we have found it necessary to give 5 per cent glucose solution by hypodermoclysis or by rectum.

5. *Rest* is an almost universal requirement in this category of patients. During the first few weeks of hospitalization our cases were kept at rest for the greater part of the day, although in general it is advisable to avoid strict bed rest because of the danger of hypostatic pneumonia. The use of sedation in restless, agitated, uncooperative psychoses requires caution. In general, we have found it advisable to avoid the use of bromides because of their rapidly cumulative toxic effects. The preferred drugs are the milder barbiturates. Overdose of sedatives is to be avoided because of the danger of aggravating the already existing mental confusion.

6. *Exercise, occupational work and physical therapy* are useful. After patients become well-nourished and rested and sufficiently free from physical handicaps to make them advisable, athletic activities suitable for elderly persons may be prescribed, such as bowling on the green, golf, walks, croquet, shuffle-board and the like. It has been found particularly important in this age group to evaluate the patient's physical capacity and manage the program of recreational activities accordingly. For cooperative patients, occupational therapy in the form of useful hobbies which the patient has formerly had, and is able to remember, can be utilized with benefit. Mild physiotherapy, such as massage, ultra-violet irradiation, mild cabinet baths and hydrotherapy, is usually prescribed, in addition to a minimum requirement of fresh air and sunshine.

7. *Psychotherapy*, consisting of an attitude of kindness and understanding towards the patients in those taking care of them, is stressed as a therapeutic requisite. Efforts may be made to alleviate emotional distress by sympathy, cheerfulness and the counsels of common sense.

In addition to these routine general measures, special treatments were given in our series of cases for chronic nephritis, glandular deficiency, cardiac decompensation, dysentery and diabetes. A few examples of these have been shown in the case histories.

PREVENTIVE TREATMENT

Adaptation of treatment measures used during hospitalization can be applied in the home as preventive treatment by the general practitioner. In cases showing prodromal symptomatology such measures are imperative, and in all persons approaching the old age brackets it becomes increasingly advisable for the physician to examine periodically for possible foci of infection, and review the diet, fluid and vitamin intake, elimination, habits of rest and exercise and the amount of fresh air and sunshine which the patient receives. Of the more important treatment measures, adequate rest is found to be the most difficult to secure in the home, especially among persons of narrow means. Elderly women particularly are often motivated to do daily work far beyond their strength by desire to serve the families which give them their homes. Kindness is another requisite sometimes lacking in the home. Situations presenting economic problems or difficulties of family management will be dealt with according to the judgment of the physician, assisted by statistical knowledge that liability to mental breakdown increases with age. During the period of senescence, comparable in susceptibility to disease to that of infancy, it may be expected that where preventive treatment is carried out it will yield a greater reduction in the number of committed cases of senile psychoses than was obtained by hospital treatment of such cases after breakdown had occurred. The material presented in this report, showing the end-effects of pathogenic forces at work in our entire elderly population, suggests the

need of instituting a widespread systematic program for preserving somato-psychic health in the aged, approaching in scope that now in effect among children in our public schools.

COMMENT

In the 123 cases studied accurate prognosis was not possible. Many cases which could not be distinguished diagnostically from the 30 recovered cases failed to recover. Essentially the same basic treatment was applied to all and it was not possible to foretell which would benefit by it to the extent of returning to normal life. The outlook was somewhat more favorable for patients with recoverable bodily ailments. No uncomplicated case of senile dementia, and no case of arteriosclerotic psychosis which was ultimately found to be uncomplicated, recovered. Our conclusion is that senile and arteriosclerotic psychoses of the true types resulting from degenerative cortical changes are not reversible, but that in cases not diagnostically distinguishable from the true types correction of a second more obscure layer of complications yields a recovery rate of 25 per cent.

SUMMARY

1. Increase in the number of patients admitted to mental hospitals with senile psychoses was believed to indicate the need of studying such cases with a view to their prevention and amelioration. One hundred twenty-three cases admitted to the Pennsylvania Hospital from 1930 to 1939 inclusive, and diagnosed at staff conferences after three or four weeks of hospital treatment and observation as senile dementia or arteriosclerotic psychoses, were studied.
2. In this group of long-standing cases treated 25 per cent made social recoveries and were able to return to normal life.
3. Prodromal symptomatology beginning at least six months to one year before hospitalization is usual in such cases. Points aiding in early recognition of the prodromal stage have been stressed.
4. Multiplicity of causation is almost universal, with definite somatic disorders heavily preponderant.

5. General treatment consisting of elimination of foci of infection, correction of toxemias, constipation, avitaminosis, malnutrition, dehydration, fatigue and circulatory deficiencies is essential. Special treatment may be given as indicated.

6. In general accurate prognosis is not possible, but is somewhat more favorable in cases showing correctible somatic disorders.

7. There is reason to believe that the recovery rate of 25 per cent can be duplicated

and improved upon, and preventive measures made more effective, as the traditional medical attitude of hopelessness towards the mental disorders of old age gives place to one of scientific inquiry and painstaking clinical effort.

8. Organization of a nation-wide system of preventive treatment for preserving somato-psychic health in the old age group would be, both medically and economically, a richly repaying undertaking.

THE PSYCHIATRIC SERVICE OF AN ARMY STATION HOSPITAL¹

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The civilian psychiatrist placed on duty in a station hospital at a large training camp is soon faced by the fact that military psychiatry offers many new situations and experiences. One learns that the primary function of military psychiatry is essentially that of diagnosis and disposition—a sorting out of the disabled soldier from those who can perform some useful military service.

Our experience is based upon 20 months service on the psychiatric section of a station hospital in a large camp which during the past 9 months has doubled its personnel. Originally the camp contained a Recruit Reception Center, a Medical Replacement Training Center and a Quartermaster Replacement Training Center. Nine months ago the medical center moved out and was replaced by the expanded quartermaster unit and the Quartermaster Officers Candidate School. At the reception center, selectees brought from civilian life are clothed, immunized and classified, and after several days are sent to training centers throughout the United States. Recruits from various sections of the country are assigned to the replacement center for 13 weeks of training, after which they are sent to permanent organizations. As a result, the population of this camp is always changing and the majority of our soldiers have not been in the army more than 3 months. Our experience, then, has been in dealing with soldiers who are new in the service and whose military training has been in the relative safety of a camp in the United States.

At the Camp Lee Station Hospital the neuropsychiatric service has a large daily census. Besides caring for the hospitalized neuropsychiatric patients, many patients are seen daily in consultation. These come as outpatients from the dispensaries throughout the camp or from the other services within the hospital.

¹ Read at the meeting of the Neuropsychiatric Society of Virginia, Charlottesville, Va., Oct. 14, 1942. Approved for publication by the War Dept. Manuscript Board.

A discussion of the care and disposition of neuropsychiatric patients will be given in accordance with the main reaction types encountered: the psychoses, convulsive disorders, constitutional psychopathic states, mental deficiency, psychoneuroses and malingering.

PSYCHOSES

The disposition of a psychotic soldier is immediate discharge from the army. Even if his psychosis is an acute episode of brief duration, with apparently complete recovery and good prognosis, he is still considered to be a poor risk. The only exceptions are the toxic delirious states. If the symptoms of the psychosis are recognized within the first 6 months of military service, the illness is considered to have existed prior to army service and the soldier is not entitled to prolonged care in an army hospital or to the benefits of the Veterans Administration Acts.² Recommendations are made to the nearest relatives that the soldier be transferred to a state or private institution. They are advised, however, of their right of assuming the custody of the soldier if they insist upon doing so. They must then sign a notarized affidavit guaranteeing adequate care, supervision and necessary medical treatment. If the psychotic soldier has been in the service for more than 6 months and if there is no evidence that he had symptoms of his illness prior to service or during the first 6 months in the army, his psychosis is considered to be in line of duty and he is then entitled to admission to a hospital of the Veterans Administration.

When either the authority for admission to a hospital or the affidavit of the nearest

² This procedure has been changed by the act of March 17, 1943 (Public Law No. 10, 78th Congress). Under the provisions of this law any person who serves in the active Military or Naval Service of the United States during the present War is potentially entitled to hospitalization as a beneficiary of the Veterans Administration, whether or not his disability is considered to have existed prior to his entrance into the Service.

relative is received, the soldier is simultaneously presented before two boards of officers. One decides on the mental competency of the soldier, the other passes on the recommendation for a certificate of disability for discharge (C.D.D.). A psychiatrist is a member of each board. The necessary papers are approved by the camp surgeon and forwarded to the Commanding General of the camp who has the authority to grant the discharge. The soldier's transportation is furnished him and he is accompanied by one or two attendants, one of whom is usually a medical officer. The discharge certificate given the soldier is an honorable discharge which makes no mention of the psychiatric illness, but states merely that the discharge is granted in accordance with a specific army regulation.

We have not made a current statistical study, but in a survey(1) of 200 soldiers discharged from our hospital for neuropsychiatric disability in 1941 we noted that 61, or 30.5 per cent, were psychotic. Of the 61 psychotics, 51 were schizophrenic, 3 manic-depressive, 2 psychosis with mental deficiency, 1 paranoid condition, 1 depression with obsessive features, and 3 unclassified. Of the schizophrenics, 41 per cent were paranoid, 16 per cent simple, 10 per cent catatonic, 6 per cent hebephrenic, and 27 per cent unqualified.

The psychotic soldier spends from 6 weeks to 2 months in the hospital before his discharge arrangements are completed. In general, his treatment is similar to that in a civilian hospital except that none of the aggressive forms of therapy are utilized. The reasons for their omission are that our primary function is one of disposition, the psychiatric staff is too overburdened to attempt such therapy, and complications might occur which would subject the federal government to compensation suits in otherwise non-service-connected disabilities. We have no elaborate physiotherapy equipment. The neutral pack is the most frequent hydrotherapeutic procedure used. Continuous tub baths are occasionally given in the ordinary type of bath tub. Restraint sheets and corsets are rarely prescribed. The indication for sedatives is determined by a nightly sleep chart. Recreational therapy is used exten-

sively. Experienced recreational aides are provided by the American Red Cross.

CONVULSIVE DISORDERS

As with the psychotic soldier, the soldier with a definite convulsive disorder is immediately discharged from the army. A grand or petit mal seizure witnessed by a medical officer is usually sufficient to warrant a discharge. Where the convulsions are infrequent and have not been observed we attempt to obtain confirmatory information from a social service investigation obtained for us by the American Red Cross. Soldiers admitted to the hospital because of a convulsive disorder are given a careful neurological survey. In addition to the usual laboratory procedures, we obtain a glucose tolerance test, an electrocardiogram, skull x-rays and a lumbar puncture. In practically all of our cases the convulsive disorders are of undetermined etiology or so-called "idiopathic epilepsy."

An occasional problem is the soldier who has his first convulsion in the army. The story is that of a seizure occurring a day or so after induction. This has often been preceded by several days of inadequate food intake and insufficient sleep due to a last minute rush to finish up some business and a farewell party at which a number of alcoholic drinks have been imbibed. If the soldier's seizure was of the grand mal type, witnessed by a medical officer or by a reliable person whose description indicates that it was unmistakably of the grand mal type, the soldier is discharged. Otherwise, if his clinical and laboratory examinations are non-contributory, he is given a trial of duty and his commanding officer is advised of the necessity of observation for further attacks. Before the war, when transportation facilities were available, we started an investigation of the electroencephalographic findings in this type of soldier. This was done at the Duke University Hospital through the courtesy of Drs. Lyman and Lowenbach. In our small series of 15 cases the EEG was not of much help. Only one tracing was pathognomonic of epilepsy, three were suggestive, and the remaining eleven tracings gave no indication of abnormal cerebral electro-activity.

A relatively large number of soldiers with a convulsive disorder are seen in our service. Of the 200 psychiatric disabilities mentioned above, 34, or 17 per cent, were discharged because of epilepsy. The majority of the soldiers in this group are quite different from the epileptics encountered in civilian practice. Most of them have never sought the advice of a physician and have not taken medication. They minimize their seizures and express a keen desire to remain in the service. Until forced into the hospital by a convulsion they perform their military duties satisfactorily. They are not infrequently characterized by their officers as superior soldiers.

PSYCHOPATHIC PERSONALITIES

In the army the constitutional psychopathic personalities, chronic alcoholics, drug addicts and mental defectives, uncomplicated by psychotic or severe psychoneurotic manifestations, are not disposed of by a medical certificate. In accordance with Army Regulations 615-360, Section VIII, these persons are presented before a board of officers, one member of which is a medical officer, to determine whether or not they are constitutionally fitted to perform the routine duties of a soldier. In practically all of these cases the psychiatrist is called on to examine the soldier and offer an opinion as to his suitability for military service. He is aided by a Red Cross social service history and reports from the soldier's officers. The latter are supposed to have given the soldier every opportunity to adjust to military service by trying him at various positions and in different organizations. A discharge is not recommended merely upon the recognition of behavior traits indicative of the psychopath. A good number of these men can be provided with a type of work at which they are of use to the army. Every possible means of helping them to adjust to military life is offered, including reclassification and rehabilitation in special training units.

The relatively well-adjusted homosexual is not recommended for discharge just because of perverse sexuality. Most of the men we have seen are not of the aggressive type. They try to hide their perversity from their fellow soldiers. They either abstain

from sexual intercourse or have occasional homosexual experiences with known homosexuals in neighboring towns. Many of them make good soldiers. We have knowledge of several such soldiers who are performing a service to their country much out of proportion to any imagined harm their homosexuality may have produced. The suppressed homosexual who is unable to bear living in close proximity to other men and who as a result develops an anxiety reaction or panic state is, of course, not suitable for service. Several homosexuals have been discharged on a CDD because of psychotic or severe psychoneurotic reactions.

MENTAL DEFICIENCY

Mental deficiency among soldiers is a problem of relative importance. One's standards for the designation of mental deficiency undergo a transition from what they were in civilian practice. In the group of soldiers we see the average mental age is between 10½ and 11 years as determined by the 1937 revision of the Stanford-Binet. It is only when we obtain a mental age below 10 that we speak of mental deficiency of sufficient degree to warrant a discharge from the army. Our recommendations for discharge, however, are not based on the mental age alone. There is a considerable variation in quality among soldiers with the same quantitatively measured intelligence. Our advice as to retention in the service depends upon the test of life—the individual's performance in his organization. Many mental defectives who are not considered to be suitable for combat duty are retained in the army but are reclassified for limited, non-combatant service. These men are trained in special units and are later given suitable assignments.

PSYCHONEUROSES

The largest number of patients seen in our department are of the psychoneurotic reaction type. There has been a drastic change in our policy concerning the disposition of this group of soldiers since our entrance in the war. During our earlier experience in the army we considered that we were conscientiously performing our duty when we recommended a discharge for the

moderately severe and severe psychoneurotic soldiers. We felt that these individuals were unstable and would not stand up under rigid army routine and would become liabilities if sent on foreign service. However, in November, 1941, a War Department Circular was published informing us that no soldier would be discharged from the service if he could be used in any capacity whatsoever. For a time we were in a dilemma. We were seeing many soldiers who could perform some type of military service but who were unable to stand the physical rigors and the emotional stress of full military service. These soldiers began to pass between the hospital and their companies. We were not permitted to discharge them, yet they were unable to keep up with basic army training. The solution was the establishment of a disposition board at the hospital which has allowed us to proceed in the following manner: These soldiers are presented before the medical officers of a disposition board and a decision is reached as to their suitability for service. The moderately severe and severe psychoneurotics are usually considered unfit for full duty and are accordingly reclassified for limited service. This means that they are excused from certain portions of their military training which their symptoms prevent them from doing and are given duties in accordance with their abilities. They are qualified for non-combatant service only. It is only after failure at a trial of limited service or when his symptoms are obviously too severe to warrant even reclassification that a soldier with a psychoneurotic reaction is discharged from the army.

By means of reclassification a relatively large number of men are being kept in the service. On a cross sectional view of the situation this might seem desirable, but on a sagittal inspection one might predict more difficulty with this group than any possible benefit obtained from it. Experience has already shown that these soldiers spend half of their time in the dispensaries or hospitals. They collapse under any unusual demand. They will undoubtedly be pension seekers after the war.³

³ Early in 1943 the War Department recognized the inadvisability of the policy of attempting to utilize every enlisted man in some capacity even if

In our statistical survey of 200 soldiers discharged because of psychiatric disability, 105 or 52.5 per cent were of the psychoneurotic reaction type. Forty per cent of these we diagnosed as hypochondriasis. Next in frequency were the hysterics and anxiety states which were found in 17 per cent and 14 per cent, respectively. Eight per cent were diagnosed as neurasthenia. The remaining minor reaction types were found in only a few instances. Thirteen per cent were made up of individuals in whom the symptoms and findings were so mixed that they could not be included in one of the more specific categories.

The majority of the psychoneurotics whom we are now seeing are those whom we classify as hypochondriasis. This is a reaction type which is different from that seen in the average civilian psychiatric practice. These individuals give evidence of maladjustment characterized mainly by numerous and varied somatic complaints of almost life-long duration. Their histories reveal poor application at school, an unsatisfactory employment record, and a poor family and social background. Definite psychogenic factors are frequently minimal or cannot be elicited. The psychoneurotic reaction they display in the army differs in few respects from their life-long pattern. These individuals often made a fair adjustment at home where their symptoms had been accepted for years, where they had been catered to and protected by their families, and where they worked if and when they felt like it. They have difficulty adjusting to army life. In the service their symptoms are aggravated and they soon are referred for psychiatric examination. These soldiers show very little desire to effect any improvement in their adjustment. In fact, there is more reason to retain and exaggerate their neurotic symptoms, for improvement would mean the return to the distasteful demands of military service.

In our civilian psychiatric experience, which included the active dispensary service of a psychiatric clinic, hysterical reactions were rarely encountered. In the army, espe-

he were not fit for regular service. As a result soldiers with moderate or severe psychoneuroses are now being discharged from the Army as soon as their condition is recognized.

cially since our entrance into the war, conversion phenomena are relatively frequent and include paralyses, deafness, blindness, convulsions, sensory disturbances and attacks of amnesia. The onset is often associated with a traumatic experience and occurs soon after arrival at camp. Many of the reactions begin on the rifle range and are similar to what was erroneously referred to as "shell shock" during the last war. In contrast to experience in civil life, these hysterical phenomena are usually resistant to treatment. As mentioned above the reason for this is that the soldier has too much to gain by retaining his disability. We usually attempt treatment by hypnosis and sodium amytal narcosis, but these have proven of benefit mainly in hysterical amnesias.

In the psychoneurotic group we see many men who appear to be consciously exaggerating their symptoms. These soldiers are told frankly that we recognize the presence of mild symptoms produced by an emotional disturbance but that we are also aware of the conscious element by which they are trying to increase their disability. In such cases we telephone the soldier's commanding officer in the presence of the soldier and formulate our conclusion to him. We advise that disciplinary measures may be necessary if the soldier does not conscientiously apply himself. Further management of the soldier is the result of observation by his officers and consultation between them and the psychiatrist.

MALINGERING

Malingering has been encountered only rarely in our experience. In the several thousand soldiers seen in our department, malingering has been apparent in only a few instances. To the experienced psychiatrist the conscious production of symptoms is readily perceived. Our recommendation in these cases depends upon the situation. In the constitutional psychopathic personality malingering is only a part of the picture and our recommendations are based upon the entire reaction. In most instances the malingering was found in soldiers with below average intelligence. Malingering is frequently erroneously diagnosed by physicians when the soldier presents *bonafide*

psychotic or psychoneurotic manifestations. In dealing with psychoneurotics this same tendency is noticed among the more neurologically oriented psychiatrists. At a recent meeting of The American Psychiatric Association an army officer objected to a statement that malingering was rarely seen. He stated that in his experience it was frequently observed, but then proceeded to relate as examples several case histories which were readily recognized as typical psychoneurotic reactions.

The advantage of proper selection of military personnel is demonstrated by the rarity of psychiatric casualties among the officers and officer candidates. Since the establishment of this camp thousands of officers have been on duty for periods ranging from one to 20 months. Many of these men came into the army from civilian life and had an adjustment to make comparable to that of the selectees. Yet, since this hospital was begun, we have had brought to our attention only one psychoneurotic and 4 psychotic officers.

At the Quartermaster Officers Candidate School one class of 1,500 officers is graduated every month, many of whom were civilians just a few months before. These candidates are under extreme pressure during their entire training period. They are forced to complete in a few months what should require from 6 months to a year. In spite of that fact an average of only one or two candidates from each class are seen in our department. Of these, the majority are merely disqualified for commissioned service, but are able to return to their former duties.

CONCLUSION

We have briefly reviewed the functions of the neuropsychiatric service of a station hospital at a large training camp in the United States. We have stressed the fact that the primary functions of military psychiatry are essentially those of diagnosis and disposition. The disposition of the various reaction types was discussed.

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CONVULSIVE DISORDERS AND THE AUTOMOBILE DRIVER¹

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To the layman the problem of eliminating the epileptic driver is a relatively simple one depending only on a decision by the physician whether the patient is accustomed to having spells or seizures of a type called epilepsy. It cannot be gainsaid that loss of consciousness while at the wheel of a motor car is perhaps the most viciously dangerous psychosomatic change which can occur in the life of an individual.

When one realizes that some accidents may be due to a short distraction of attention of the driver of a rapidly moving car by virtue of a mere bee-sting, or that occasionally a driver has an accident due to the fact that he tries to address some remark to a companion sitting beside him, we cannot say that such a violent avulsion of the motor car operator's driving skill as a seizure is not extremely important. No further arguments need be presented relative to the dangers involved but experiential considerations point out a need for a rational attitude towards the problem.

In most states where epilepsy serves as a recognized entity to justify the refusal of drivers' licenses—this is true in most states—there usually appears such a simple question as "Do you have epilepsy?" The honest, law-abiding citizen, who is an unfortunate sufferer from *grand mal* will put down "yes" and will not be granted a license, yet occasionally he may be harmless. Others will lie or evade.

Suggestions have been made which are intended to take care of evasive or untruthful cases, for example a complex question is suggested by the American Association of Motor Vehicle Administrators. This is a general proposition to ask a candidate whether he has any cardiac, paralytic or epileptic condition, fainting or dizzy spells which might affect his ability to operate a

motor vehicle in a safe manner. On the face of it this seems to be a good idea. However the average candidate for a license, in my experience, requires an extremely simple question. He cannot answer such a complicated question involving three or four factors nor can he be expected to decide unfavorably that he has a disorder which would affect his ability to drive a motor car and perhaps one which is very difficult of evaluation.

From my experience, most of the persons suffering from a somatic disease, who are driving motor cars, think wishfully that in spite of the fact that they are unaware of the existence of the disorder, they can continue to drive a car safely.

Only the day before this paper was written we examined a young man in the clinic:

Case T 2133.—A white male, twenty-one years of age, American born, and educated to the eighth grade. Such a boy as this should be able to cooperate with the License Bureau in the matter of answering truthfully the question of whether he had epilepsy, yet we see that he secured an operator's license in 1939 at the Detroit Police Headquarters and he knew that he deliberately falsified the record.

He says, "I knew I would be rejected if I told him the truth." He also said: "I didn't think anything of the spells at that time; I knew I had epilepsy but I thought I was O. K. to drive."

So far as his intelligence was concerned, he fell within the average range. His driving record revealed that he had probably driven as many as 18,000 miles from 1939 to 1942 during the period when he had a license. He had a psychotic episode in 1939 and was held for six months in our local receiving hospital, was quite disturbed and a diagnosis of the grand mal type of idiopathic epilepsy was made.

He was taken from the hospital contrary to medical advice. When we saw him he was not psychotic. He was irritable, difficult to talk with, but this was largely due to the fact that he realized that he was losing his license and that there was not much that we could do to help him. It is interesting to note from the psychophysical standpoint, however, that he had slow reaction time. This is not an uncommon finding in our epileptic cases, so that beyond the fact that these patients actually lose consciousness and control of their cars, sometimes, even under non-convulsive conditions they may very well be slower than they should be

¹ Read at the ninety-eighth annual meeting of The American Psychiatric Association, Section on Convulsive Disorders, Boston, Massachusetts, May 18-21, 1942.

From the Psychopathic Clinic, Recorder's Court, Detroit, Michigan, Series No. C 29.

in order to be safe drivers. There was no question of typical convulsions in this case although the patient had them largely at night but about two years ago he had one or two in the daytime. Here is an example of an individual who should admit his weakness but does not.

The method which is in operation in California, described by W. E. Carter and R. W. Harvey² would probably be worth while to detect some of these cases. California makes epilepsy a reportable disorder in the same way that the exanthemata and syphilis are in many health departments. Himler has made a valuable survey of the situation.³ Himler points out that the number of accidents due to epileptics in all probability is not great, and that we know almost nothing about the number of accidents due to epilepsy because people involved in accidents are not, as a rule, examined physically at the time unless they are thoroughly surveyed in the hospital to which they are brought, or unless they are brought to a clinic such as the one in the Traffic Division of the Recorder's Court in Detroit. It must be remembered, as Himler points out, too, that it is not to the interest of these people to admit epilepsy if they possibly can get out of the situation.

On the other hand, from our experience, we have had reports made to the clinic, to the Court and to the Police Department, by friends, relatives and physicians of people suffering from epilepsy who either have driver's licenses or who have driven without such a license and who have, to the knowledge of our informants, been suffering from one of the convulsive disorders.

If the physician were to report all cases that he diagnosed as having either *grand* or *petit mal*, these reports could be checked against the files in the Driver's License Division of the appropriate government department and an occasional case of a man who continues to drive in spite of his epilepsy might be picked up.

In the case of the exanthemata the physician knows that the patient is going

to get well relatively soon or is going to pass away. If he reports the illness, it merely keeps out neighbors and discommodes the family a little bit but there is no stigma and the ability of the individual to gain a livelihood or to get along with other people later in life will not be affected. Even syphilis, since the report does not involve the public's knowing about the condition, the physician is less reluctant to report than he would be in the case of an epileptic who would continually have to give some explanation why he could not have a driver's license, particularly if he had had one prior to the compulsory-reporting era and had lost it when the physician had reported his condition. The physician is put in the peculiar position of being an informant and doing very little, from his standpoint, to aid his patient. Under these conditions some physicians will be reluctant to cooperate with such a law, although in the long run, cooperation would be expected.

Since the clinic was started it has seen about 35 cases of epileptic drivers. Since the beginning of the separated Traffic Division, which has examined some 2000 cases, one per cent of those cases (20 out of the first 2000) have had a diagnosis of one or other of the types of convulsive states. In addition there are 4 cases diagnosed as psychoneurosis, hysterical type, who have had convulsive manifestations. There are also on record 2 cases of syphilis and three of alcoholism where the history reveals that there has been a loss of consciousness at some time during the adult life of the individual. The whole group of convulsive states which might be generically called idiopathic epilepsy would have been covered by the compulsory license law. The alcoholic convulsion and the syphilitic convulsive states perhaps are covered by a question in the interrogation by an efficient license bureau medical official—"Have you ever had any fits or spells?" Sometimes these people do not know of their convulsions under any of the usual terms.

A case was brought to my attention of a young woman who had five to ten *petit mal* attacks each day. These were often of emotional onset, yet they were so typical of *petit mal* and so frequently occurred when there was no emotional stimulus that I decided that this was a case of "idiopathic epilepsy" of the *petit mal* type.

² Carter, W. E., and Harvey, R. W. Epilepsy—A reportable disease. California State Dept. of Public Health Weekly Bulletin, 18: 28, 109, Aug. 5, 1939.

³ Himler, L. E. Epilepsy as a traffic hazard. The Journal of the Michigan State Medical Society, Vol. 40, No. 9, Sept. 1941.

Because of this woman's frequent convulsions, her husband did not allow her to drive. She was taken to one psychiatrist who decided that she was suffering from a psychogenic convulsive state, requiring extensive treatment.

The husband could not afford this treatment so he kept trying to treat her with bromides and phenobarbital under the direction of his family physician. The situation was so bad that she was unable to take care of her children and her housework. About three years ago she was put on three daily doses of dilantin and since that time has not had more than a half-a-dozen petit mal attacks. She has never been diagnosed as an epileptic except by myself and I was only called in unofficially.

In the licensing situation I would have no responsibility toward this woman, although as an officer of the court, I am in the unusual position of having to report her condition had she retained her license.

The husband feels since she has had such a small number of attacks that she should be allowed to do some driving. He believes that it is unlikely that she will have any attacks while driving and, after all, she has not been diagnosed as epileptic, and if this is hysteria rather than epilepsy, there is no legal right on the part of the state to refuse the license.

Of course, the law itself does not define epilepsy with regard to driver's licenses, but leaves it to the Director of Public Safety who, with medical help, evaluates each case individually. There are a number of further complications in the licensing of the idiopathic epileptic.

Case T 515 was referred because he ran into a telephone pole. He had had two fainting spells, without any aura, without tongue biting or any of the characteristic signs of grand mal. He had syphilis, which was active at the time of our examination. This was a case which would not be reportable as epilepsy and when we asked him if he had had any fits or spells he denied them. We did find out, however, by interrogation about how the accident had occurred that he was subject to true fainting attacks.

There are many people who faint when they are driving in traffic. They may faint only once and never repeat. They have none of the signs of a convulsive disorder. Should any person who would answer a question such as this: "Do you ever have fainting spells, dizzy spells, attacks or fits?" positively, be refused a license, an injustice would be done. Each case should be examined on its merits. Even here problems arise: First, a question arises relative to those who have epilepsy only at night; such an intensive study would be well worth while

in cases where an individual had only one or two epileptic attacks during his life. Should such a person be classified as an epileptic and refused a license because of the one or few attacks that he had earlier in life and which might have continued until he was twenty, when at twenty-nine he applied for a driver's license? Our policy at the present time is to allow a person who has gone five or six years without any spells and without medication to drive because the risk does not seem to be very great. Enough research, of course, has not been done so that we can be sure that none of these people will have recurrences.

Another problem concerns those who have convulsive attacks only during sleep. We have had 2 patients of this sort who have been granted licenses; one of them had a license for eighteen years without a reported accident and without a known daytime spell. If we can be sure from an extensive history that the convulsive condition is uncomplicated, that the fits are infrequent and only at night, perhaps we can permit these people to drive.

Last but not least, I want to point out the problem which arises from treated epileptics. We have had pass through our hands 5 cases of individuals who have had convulsive attacks which for a matter of three or more years have been controlled by dilantin. Is it safe to assume that these people will never have any more convulsions? Certainly many people under treatment with this drug have had none since beginning the treatment several years ago and one must ask whether there should be any change in our attitude toward these people. In conclusion I must suggest that these and many other considerations seem to be so important that while it would be wise to make a thorough study of the advisability of making epilepsy reportable, nevertheless the advantage of having these cases thoroughly evaluated by a skilled neuropsychiatrist cannot be ignored. Again we must not forget that many of these individuals have psychic and attitudinal changes which would affect their driving as much as the actual convulsions, which is another reason for making a law which requires a psychiatric evaluation rather than a blanket method of reporting and a resulting refusal.

RELATED STUDIES ON ADJUSTMENT

REACTIONS TO EXPERIMENTALLY INDUCED STRESSES¹

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The present interest in the crucial rôle of the human factor in operating in a coordinated fashion the complex tasks of our mechanized civilization has served to emphasize the necessity of the adequate selection of human material. This is reflected in the recent growth of interest in predictive personality tests. Contemporary techniques, such as the Rorschach test, though purporting to obtain some measure of the organization of the individual personality, offer few direct data on how a person will behave under stress or frustrating conditions. The importance of the latter type of behavior as a criterion of personality adjustment emphasizes the need for test devices to measure and predict behavior under stresses which are analogous to those encountered in our industrial milieu.

I. RATIONALE

The primary aim of this study was the development and validation of relatively simple tests of varying complexity which would permit reasonable prediction of the behavior of subjects exposed to various stresses. The objective was to induce some degree of anxiety under standardized conditions with a view towards determining the relationship of the effect of the stress upon the performance of the subject to his general adjustment level in an industrial set-up.

The devices were so selected as to permit integration of the findings into a single

profile of this aspect of adjustment. This might then serve as an objective and easily quantifiable means of predicting the behavior under various stresses.

All the tests were disguised as medical and physical fitness tests to obviate as much as possible particular attitudes which might develop were the real purposes of the tests known. Motivation of the subjects was maintained at a consistently high level by informing them that the information would be used to grade their efficiency and fitness to perform industrial tasks. Each subject was made aware that he was to be compared with all the others.

II. SELECTION OF SUBJECTS

The subjects were selected from a group of 150 youths in a National Youth Administration camp devoted to the training of skilled industrial workers. Each youth was rated by the camp instructors with respect to a number of attributes, such as work adjustment, attitude toward fellow workers and initiative. In addition, comments on personality adjustment were made by the instructors. The 150 youths were then ranked with respect to the composite of these various ratings. The best 15 and the poorest 15 youths were selected as subjects for the investigation. The top 15 will hereafter be referred to as the "A" group, and the poorest 15 youths as the "B" group.

The youths selected had been in the camp for periods as long as 6 months, and ranged in age from 16 to 25 years. Recent arrivals were largely excluded, unless the instructors were sufficiently familiar with them to make detailed ratings. It should be emphasized that the instructors were competent to make such ratings because of their long-standing familiarity with and interest in boys. They lived relatively intimately with them, and were therefore able to evaluate general social adjustment as well as adjustment in the workshop.

¹ Read at the ninety-eighth annual meeting of The American Psychiatric Association, Boston, Massachusetts, May 18-21, 1942.

From the Memorial Foundation for Neuro-Endocrine Research and the Research Service of the Worcester State Hospital. This investigation was aided by a grant from the Rockefeller Foundation.

We are indebted to the members of the staff of the National Youth Administration Project at Spencer, Mass., and especially to the Director and Assistant Director, for their wholehearted cooperation.

The mean intelligence quotient (Otis) of the "A" group was 90; that for the "B" group 85. The mean age of the "A" group was 19.7 years; for the "B" group, 18.3. Neither difference, however, is statistically significant. The mean level of education of both groups was essentially the same. Each youth was given a physical examination and none was found to have any obvious physical abnormality.

III. DESCRIPTION AND RESULTS OF THE TECHNIQS

The tests to be described are enumerated in Table I. Several other tests were em-

TABLE I

Stress level	Test
A. Adjustment to new situations.	Electroencephalogram.
B. Goal aspiration.	Effect on blood pressure in a breath-holding test.
C. Anxiety-producing situations.	Motor coordination as influenced by disturbing stimuli.
D. Frustration.	Projective reactions to experimentally induced frustration.

ployed at the various levels, but since they did not prove satisfactory they are not included.

A. THE ELECTROENCEPHALOGRAM (EEG)

There were two reasons for the use of the EEG: first, as an individual measure of central nervous activity which might be of value in distinguishing between well-adjusted and poorly adjusted individuals; second, as one of the measures in an "anticipation" test, which, however, will not be described in this report.

Monopolar leads were placed on the right occiput and forehead. Five meters of EEG tracing were obtained on two occasions from each subject, who sat in a semi-darkened, shielded cage with eyes closed. The records were later analyzed for *per cent time alpha*, alpha frequency and alpha amplitude. Although qualitative abnormalities were searched for, none was found in the entire group.

The mean *per cent time alpha* on the first

day for the entire group of 29² subjects was 38.1. This agrees with mean values previously reported by Rubin(3). The mean for the "A" group was 43.3; for the "B" group 32.8. This is not a significant difference. On the second day, however, the mean *per cent time alpha* for the "A" group was 56.9; for the "B" group, 32.4. The two groups are significantly differentiated on the second day.

It is commonly known that such factors as apprehension and tenseness may block the alpha rhythm, thus resulting in a lowering of the *per cent time alpha*. When these factors are absent, *per cent time alpha* in the same individual is appreciably higher. The experimental situation itself was in all probability a source of disturbance for the subjects. Since the "B" group's *per cent time alpha* did not change on the second day and that of the "A" group increased significantly, the interpretation may be made that the "A" group adjusted to the situation more readily than the "B" group.

Since alpha frequency and amplitude are additional aspects of the EEG, it was decided to include them in a composite index. In practice, an individual with 80-100 *per cent time alpha*, an alpha amplitude of 30-50 microvolts and an alpha frequency of 9-10 per second would receive the maximum possible index score of 17. Individuals with lower or higher alpha frequencies or amplitude would receive a lower score, as would those with lower per cent time alpha. The lowest possible index is 2.

When the 24 subjects common to the other tests were arranged according to their composite indices, it was found that the "A" and "B" groups were best separated on the basis of data obtained on the second day. *Per cent time alpha* alone on the second day differentiated the two groups at the 1 per cent level, as did the means of the first and second days expressed as composite indices. The second-day composite index, however, was the best EEG measure. The separation and distribution of the two groups

² The number of subjects employed varied slightly from test to test because of factors beyond our control which made some of the subjects unavailable at the time a particular test was carried out.

on this basis are given in standard deviational units in Fig. 1.³

B. GOAL-ASPIRATION

At this level of stress the subject had to enter into an unpleasant situation in order to achieve a certain goal, disguised as a standard of physical fitness.

1. *Effect on Blood Pressure in a Breath-Holding Test.*—The subject was instructed to take a deep breath and then to exhale

Blood pressure readings were taken immediately preceding and following the test.

There were no significant differences between the two groups in the expiratory volume and in the time in which expiration was maintained. The one measure which best differentiated the "A" or "B" groups was the percentage increase in systolic blood pressure. It may be seen from the distribution in Fig. 2 that this test does not differentiate both groups as a whole, but picks out

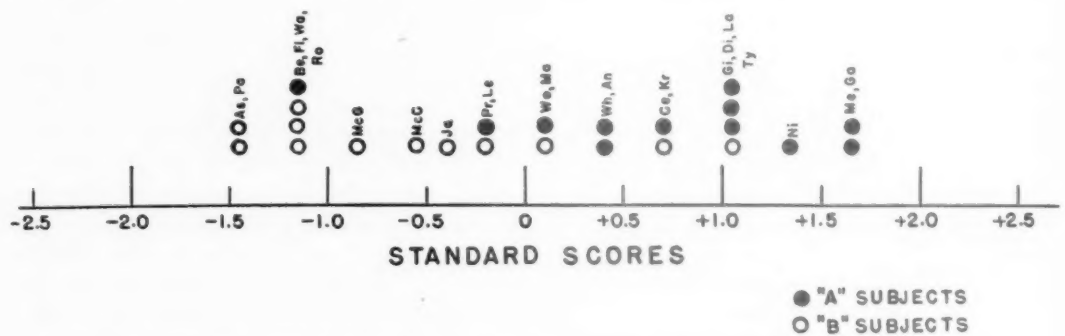


FIG. 1.—Distribution of composite indices for second day EEG. ($t=3.8$; $p=.0001$).

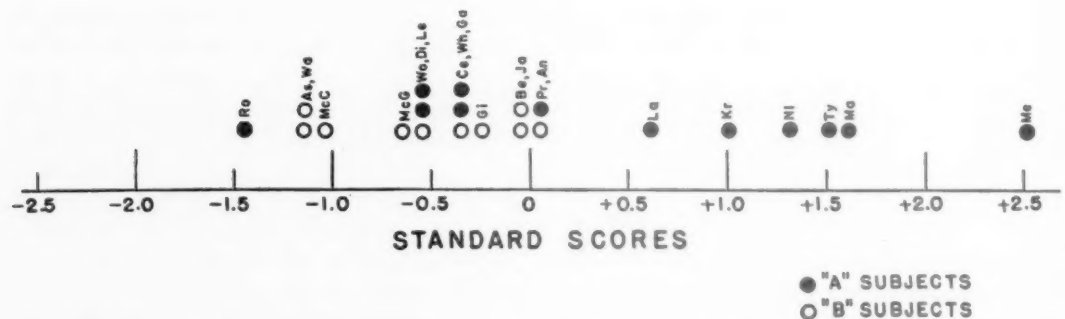


FIG. 2.—Distribution of blood pressure changes in breath-holding test. ($t=2.7$; $p=.015$).

as hard and as long as possible into a vital capacity machine. He was told that this procedure would indicate his suitability for his particular job. The volume of expired air and the breath-holding time were noted.

³The measures in the several tests have been converted into standard deviational units in order to make them all comparable. The plus values are in the direction of the "A" subjects. The zero point is the mean value of all the subjects; the actual assigned values are in terms of the probability curve units. Since all such Gaussian curves have a range of approximately $+3$ to -3 standard deviations, all scores based on such measures are rendered strictly comparable.

6 of the "A" group from the remainder of the subjects. Apparently the significance of the separation of the two groups is partially due to the narrow range of the "B" subjects.

The work expended was the same in both groups as shown by the similarity in vital capacity and breath-holding time. The greater increases in blood pressure in the "A" group may be regarded as due to either a greater expenditure of effort (aspiration) or to emotional factors; the data are not sufficiently conclusive to isolate the particular variable involved. It may be concluded, however, that in this particular situation

even though the actual goal attained was not significantly different for the two groups, there was a difference in the degree of autonomic involvement.

C. ANXIETY-PRODUCING SITUATIONS

1. *Motor Coordination as Influenced by Disturbing Stimuli.*—The technic consisted of the subject keeping a stylus fixed in the center of a small hole without touching the sides of the hole. The apparatus was so designed that when electrical contact was made between the stylus and the side of the hole, strong stimuli could be presented to the subject in a variety of combinations. These stimuli, which were automatically controlled, were: a marked increase in illumination from a projection lamp over the subject's booth, loud sounds from a fire-alarm gong and an automobile horn, a strong blast of air from a hidden nozzle directed at the back of his head and an electric shock. When an error was made, the stimuli were presented in a continuously varying order, either singly or in various combinations. Frequently no stimuli at all were presented. As a result, the subject was unable to determine whether any stimuli would result from an error, or what the particular stimulus would be. The stimuli were sufficiently intense to be upsetting without being painful.

The main purpose of this test was to determine, in terms of motor performance, the effect of an anxiety-producing situation over which the subject could exert some degree of control. If he made no errors he would not be subjected to the unpleasantness of unpredictable stimuli, and he would receive a good score on the test. If, however, he made errors a variety of strong stimuli would be released which, in turn, might result in his making still more errors and would give him a poor score. It must be remembered that the youths were earlier purposely given the impression that their test scores would count heavily in their general camp rating. The remarks and behavior of the subjects during this test left little doubt that it was effective in producing stress. The test is effective for this purpose primarily because of the large number of stimuli which were presented in continuously varying combinations. The frequent omission of stimuli

(with the effect that the subject was always confronted with the unexpected) and the motivation supplied by the instructions were additional factors in producing a considerable measure of tension and anxiety.

The subject was given twelve 30-second trials in the test. Six of the trials were stimulation periods; the remainder were control trials, during which no stimuli were presented. The trials were arranged in a predetermined counterbalanced order, with the result that the subject was unable to determine in advance whether a given period would be a control or a stimulation trial. The comparison in performance of the first two and last two control periods, between which the stimulation trials intervened, offered a measure of the effect of the stress situation on the subject's motor behavior. The use of control periods as criterion trials rules out the objection that the test merely measures the effect of distraction upon performance, since during these trials no stimuli at all were presented. The phenomenon obtained reflects, rather, the degree of generalized disturbance generated by the preceding stimulation trials.

In each trial the number of errors was recorded on an automatic counter; the percentage of error-free time, graphically. The latter measure was favored, since it appeared to be a more sensitive indicator than the mere number of errors, reflecting more adequately the ability of the subject to stabilize his performance. In obtaining this measure, all time intervals over one-half second were added cumulatively for each trial. By dividing by the total time of the trial, a measure was obtained of the amount of time during which the subject was in control of the situation. One-half second was taken as the minimum, since any time interval less than this might be merely a result of the subject's momentary unsteadiness in over-compensating for the error he has just made.

Fig. 3 shows the amount of error-free time during the stimulation and the control trials for both groups of subjects. It may be seen that there is considerable overlap of the two groups during the stimulation trials, although there is some indication of a difference. On the other hand, the error-free time in the control periods progressively increases in the "A" subjects and decreases for the

"B" group. Similar trends occur with respect to number of errors.

Fig. 4 shows the distribution of the subjects based on the difference in error-free time of the first two and the last two control periods. In this distribution, individual differences in basic performance are equated by the use of initial level of steadiness as

frustrated by surreptitiously controlling his score in a game involving motor coordination. The technic was so designed that after the subject had demonstrated his proficiency in the game, he was prevented from attaining the goals he had set for himself. The details of the situation were such that motivation and interest in the test were kept at a

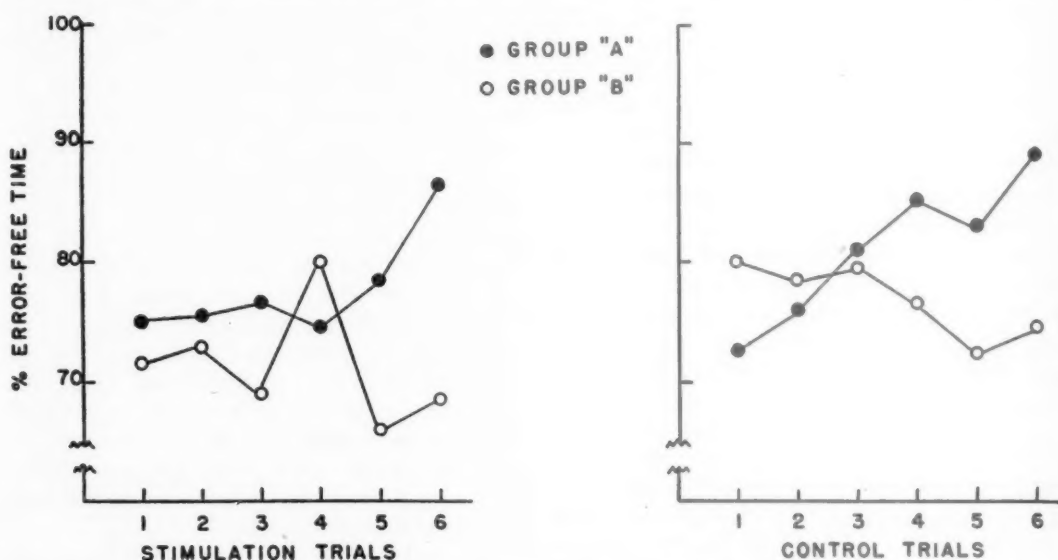


FIG. 3.—Percentage of error-free time of motor performance during each thirty-second trial.

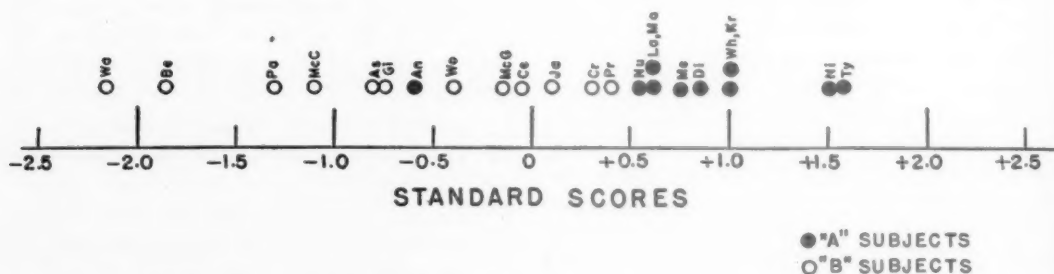


FIG. 4.—Distribution of changes in error-free time of motor performance during stress. ($t = 4.6$; $p = .00001$).

the baseline. The difference between the groups is highly significant at the 1 per cent level. The number of errors also differentiates the two groups, though not nearly so well ($t = 2.3$; $p = .03$).

D. PROJECTIVE REACTIONS TO EXPERIMENTALLY INDUCED FRUSTRATION

This test is a modification of a technic previously reported(2). The subject was

fairly high level. The game was similar to a "pin-ball" game, in which the subject used a small cue to hit a ball along a groove. His score depended upon the stopping point of the ball. Unknown to the subject the experimenter would influence the stopping point by means of a hidden foot-pedal controlling a lever system which tilted the board. The score could thus be controlled at will by the experimenter. The subject was told that this was a test of motor coordination, and that his

performance would be compared with that of other members of the group. He was also told that his score should be maintained above a specified minimum, as that represented the lowest score usually obtained. To keep his motivation at a consistently high level he was told to estimate his score in advance of each group of 5 trials. All estimates and scores were kept on a large scoreboard in front of the subject. When he reached his estimate, it was recorded in white chalk. When his scores fell below the estimate, red chalk was used to indicate his failure. All scores were added cumulatively.

The subject was at first permitted to win for 10 groups of 5 trials each. The experimenter then frustrated him by manipulating

the two projective tests served as a measure of the subject's reaction to the frustration in the game.

The following trends resulting from the frustration were found to be statistically significant. The "B" group showed, as a result of the frustration, a marked decrease in superiority themes of the central characters, a considerable increase of themes of non-physical aggression, coupled with a decrease of those dealing with "internalized emotional states." The "A" group, on the other hand, showed an increase in the themes dealing with "internalized emotional states," and no decrease in the superiority of the central characters.

These shifts resulting from the frustra-

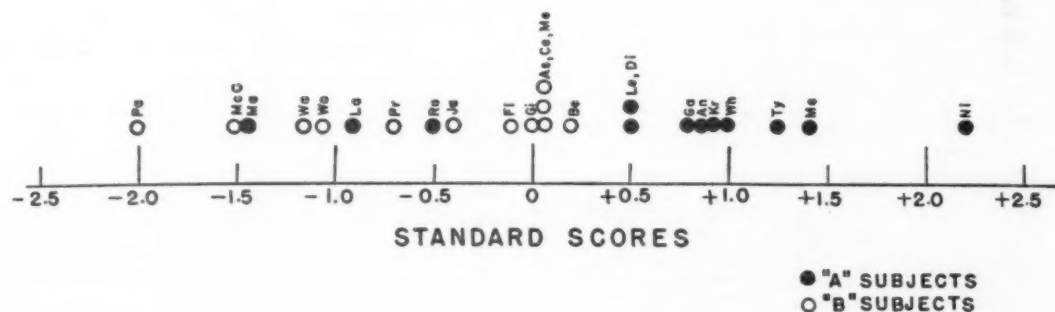


FIG. 5.—Distribution of composite indices of projective reactions to frustration. ($t = 3.2$; $p = .001$).

the game, so that he consistently received very low scores, regardless of his effort.

Immediately before and after the frustration the subject was given a modification of the thematic apperception test to obtain a measure of his projective reactions to a series of pictures, about each of which he had to make up a story. The details (themes) of the stories were scored in a quantitative and objective fashion for the type of content. The themes were analyzed with respect to the aggression of one character in the story directed towards another character; "internalized emotional states," or aggression of a character directed towards himself, and the superiority and inferiority of the central characters (with whom previous research had indicated the subjects tend to identify themselves). A comparison of the results of

tion may be interpreted as follows. The projections of the more poorly adjusted "B" subjects manifest an increase in aggression as well as a decrease in their self-evaluation. The better adjusted "A" subjects, however, are characterized by a maintenance of their self-estimation even though their projections tended to be directed inward.

A composite score was derived for each subject based on the direction and degree of the individual shifts in the above-mentioned categories of projections resulting from the frustration. The particular details of this scoring system are discussed elsewhere(1). The distribution of these scores is shown in Fig. 5, which shows a high degree of separation of the two groups, with an overlap of only three "A" subjects. This separation was found to be statistically significant.

IV. COMPOSITE PROFILES OF INDIVIDUAL SUBJECTS

A. DESCRIPTION

Fig. 6 shows the composite profiles derived from the standard scores of the best measure in each of the four test levels (A, B, C, and D). The scale at the top is in terms of standard-deviational units. The zero point represents the mean for all subjects (groups "A" and "B" combined). Values to the right (plus side) of the zero line are in the direction of good adjustment;

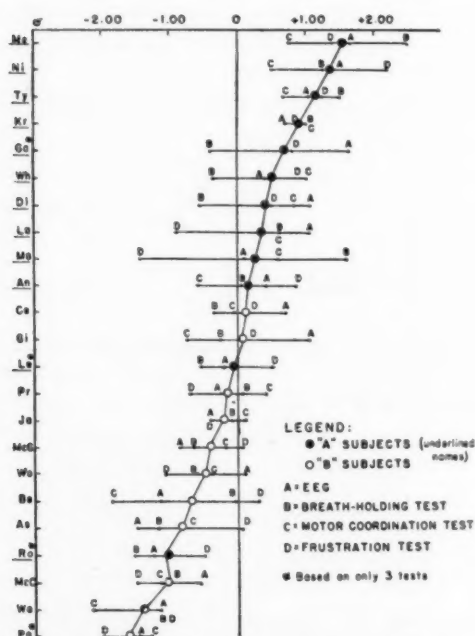


FIG. 6.—Composite profiles in standard scores, based on 4 tests.

to the left (minus side) that of poor adjustment. The further away from zero on the plus side a particular score falls, the better the adjustment. The converse holds for the minus side.

The mean scores of the individual subjects are connected by the solid vertical line. Each horizontal line through the mean score indicates the range of the subject in the four tests. The position of the letters directly above each horizontal line indicates the score for a particular test. The youths are listed in order of their mean score from highest positive to lowest negative values.

As mentioned earlier, test B is not highly

satisfactory as a differentiating measure, since it selects only 6 of the "A" men, leaving the rest of the "A" subjects completely undifferentiated from the narrow range of "B" men. For this reason the low test B values for subjects Ga, Wh and Di distort the mean scores and increase the ranges. The influence of this factor becomes more apparent in comparison with Fig. 7, where only the three other measures were used (A, C and D). It may be seen that many of the "A" subjects now have appreciably

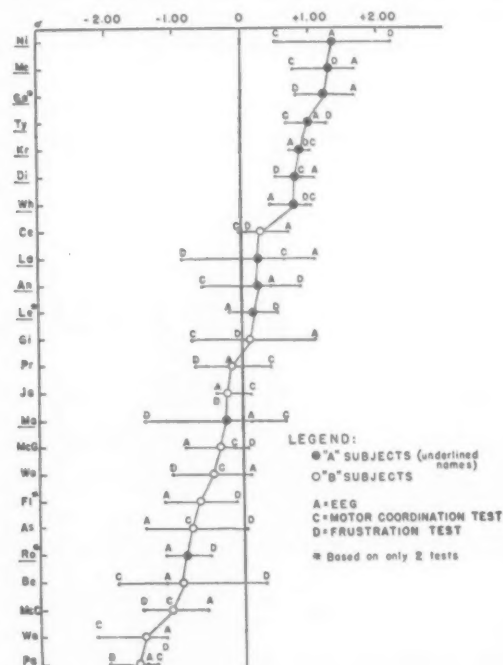


FIG. 7.—Composite profiles in standard scores, based on 3 tests.

narrower ranges as well as higher mean scores.

By using the composite of only tests A, C and D, the upper members of the "A" group are more clearly differentiated from the remainder of the subjects. It may be seen that the individual test scores for the top "A" men are 0.5 of a standard-deviational unit or more away from the mean of the entire group, as compared with only four subjects in Fig. 6. The meaning of such a profile chart becomes clearer when it is interpreted in terms of the percentage of the population included within one standard-deviational unit. Thus, if the present data are repre-

sentative, and if they had been obtained from a random sample,⁴ 68 per cent of the general population would fall between plus and minus one standard-deviational unit; 95 per cent of the population would lie between plus and minus two standard-deviational units. By expressing the scores in this manner, it is possible to determine the relative standing of the subject in the general population.

The degree of differentiation obtained by the individual tests and by the composite profiles becomes more significant when one considers the relative homogeneity of the population employed in the investigation. On the one hand, selection of youths by the camp eliminated serious personality problems. On the other hand, such factors as the socio-economic status, education and intelligence of youths in the N.Y.A. camp tended to preclude the presence of individuals at the other extreme of adjustment level.

It may have been noticed that the various measures do not completely differentiate the "A" and "B" groups. The instructors' ratings from which the classifications were made had been recorded on standard forms used in the camp, which placed special emphasis upon adjustment in the workshop. After the test data had been analyzed, it was found that several subjects consistently accounted for most of the overlap of the "A" and "B" groups. The apparent inconsistencies between the test ratings and the instructors' ratings indicated the desirability of obtaining further information on the more social aspects of adjustment of the youths.

When this was done, the separation of "A" and "B" subjects became more complete. For example, subject Ce (Fig. 7)

⁴ Such a procedure would hold only if the data had been obtained from a random sample of the general population. It is recognized that the present samples are biased in that they were selected from the extremes of the distribution in the N.Y.A. camp. In view of this fact, one is not justified in interpreting too strictly the standard deviational units in Figs. 6 and 7 in terms of the normal probability curve deviates. The argument would hold, however, if they were obtained from an unselected sample. In the present data the actual distribution of the test scores range generally between plus and minus two standard-deviational units from the mean. It would be expected that in the general population they would extend beyond this to 3, and possibly to 4, standard-deviational units from the mean.

was found to be more prominent in the community activities of the camp than would be expected from the information contained in the instructor's rating. He was on the editorial staff of the camp newspaper and was on several camp committees, such as dance and athletic, thus appearing to manifest better than average social adjustment. In view of this, the apparent discrepancy between his original rating as a "B" man and his test rank in the lower portion of the "A" group is not due to inadequacy of the tests themselves. Similarly, that subject Ro belongs in the lowest portion of the entire group, despite his original "A" rating, was confirmed later. When the apparent contradiction was brought to the attention of the Assistant Director of the camp, he stated that Ro was an excellent workman under ordinary conditions, but criticism or advice upset him to the extent that his efficiency as a workman was seriously impaired.

B. DISCUSSION

A subject's rank with respect to the rest of the group may be approximated by his mean score in the composite profile. This should be interpreted in the light of the range of the separate test scores. That is, the degree of consistency between the various test values is of importance in determining the emphasis to be placed on the rank indicated by the mean score. An illustration is found in the case of subject Kr. His mean score places him fifth from the top of the entire group. The range of his test scores, however, is only 0.3 of a standard-deviational unit on all four tests. On this basis his position with respect to the other top-ranking "A" men is verified by his consistent performances at the various test levels. It is of interest that subject Kr was described by the Assistant Director of the camp as a very stable, well-liked individual. On the other hand, where there is marked spread of the separate test scores, as in the case of subject Be, the mean score may not be entirely indicative of his level of adjustment. It may be noted (Fig. 7) that his test scores have an extremely wide range of over two standard-deviational units. Accompanying the instructor's rating form for this youth was the following comment: "Attitude very changeable

and very surly at times. He was a very good worker at start but seems to have lost interest." In a person of this sort, the separate test values may outweigh the mean score in determining his adjustment level. The fact that subject Be's test D (frustration) value is on the plus side of the zero line indicates that in this respect, at least, he is not as typical a "B" man as his other test scores indicate. His reactions to frustration are more like those of the "A" subjects than his performance in "anxiety-producing" stress conditions or adjustment to rather naturally upsetting situations, as reflected in the EEG. Therefore, granting that the tests adequately reflect the behavior levels they purport to measure, and that the range of test scores is not due primarily to experimental error, a specific test may assume major importance when emphasis is placed on a particular type of adjustment desired of the subject. For example, if it were required to select individuals primarily on the basis of personality reactions to frustrating situations, this youth would rank higher than his mean score demands. However, the other measures would carry more weight in determining his rank when selecting for ability to withstand the effects of stress on motor performance, or adjustment to new situations. Other subjects showing wide ranges in their test scores could be analyzed in a similar fashion.

V. CONCLUSIONS

Although the test program described in this report offers some promise for the selection of individuals on the basis of some aspects of adjustment in an industrial situation, confirmation of its effectiveness is highly desirable. The results obtained are to a large extent in harmony with the original assumptions made when the tests were devised. For purposes of practical application, however, they should be repeated with greater emphasis upon predictive value. It would also be desirable to employ subjects who are more heterogeneous in social background and occupational interests, and who

represent a broader range of adjustment than those employed in the tests reported here. Since the original selection of the present group of subjects was largely determined by the level of gross social adjustment in a relatively simple environment, it would be advisable to consider the relationship between performance on these tests and adjustment in a more strictly psychiatric sense. This would necessitate the use of actual or potential psychoneurotics as subjects.

In view of the complexity of the factors involved in such a general concept as personality adjustment, it is not likely that a single test can be entirely satisfactory as a differentiating device. A group of tests such as those reported here, which tap different levels of personality organization and integration, come closer to this goal by emphasizing at least some of these factors.

VI. SUMMARY

Two groups of subjects representing extremes in adjustment in a camp devoted to instruction for industrial occupations were given a battery of tests representing different levels of complexity and personality organization. The tests were concerned with reactions to stress situations.

Most of the tests were found to differentiate the extremes in the range of adjustment. A composite profile was derived from these tests which showed a good degree of correspondence with the actual adjustment level in the camp as determined by the rating sheets of the instructors. With some modifications, these tests should be suitable for practical application as selection devices.

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PSYCHOPATHOLOGY OF STUTTERING¹

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I. INTRODUCTION

Stuttering fails to be recognized as a psychiatric problem. This is shown by the marked discrepancy between the small number of cases admitted to psychiatric clinics and the exceedingly large number of cases treated in speech clinics or classes. As an illustration, in 1941, 28,000 speech cases, including 5000 stutterers, were treated in special classes of the Speech Improvement Department, New York Board of Education,² while a survey of 1963 cases admitted at the Institute of Child Guidance, New York City, for various behavior and neurotic disorders, included only 27 cases of speech difficulties, some of which were undoubtedly stuttering cases. This communication attempts to show that stuttering is a psychiatric problem and to formulate the psychodynamics involved.

II. PERIPHERAL STRUCTURES USED IN SPEECH

The act of speech is operated through peripheral structures which, strictly speaking, are not organs of speech. This was first pointed out by Sapir³ and was further emphasized by Ombredane⁴ and Travis.⁵ As expressed by the latter: "The entire peripheral speech mechanism may be identified with biologically older and more fundamental vital functions which are seriously altered during vocalization." This requires

a fine, well-integrated, neuromuscular act which is largely unconscious. The structures used in speech can be divided into three large groups related to the following functions: (1) *Respiration*—Speech takes place during, and utilizes, the expiration phase. (2) *Phonation*—As emphasized by Travis, even the larynx, which as an organ of phonation is probably the most specific of all speech structures, is not entirely an organ of phonation, as shown by its reflex function of air volume regulation and protection of the trachea against foreign objects. (3) *Articulation*—This is operated through the neuromuscular action of the tongue, soft palate, uvula, lips and lower jaw. The latter structures are under voluntary control and belong to the upper digestive tract. It is primarily the relation between eating and speaking which forms the basis of considerations for the etiology of stuttering in this paper.

III. DEFINITION OF STUTTERING

Stuttering is a disturbance, either tonic or clonic, of the function of speech characterized by the interference with the flow of speech. The tonic manifestations are in the nature of blocks; the clonic are marked by repetition of speech sounds. It rarely happens that the speech disturbance presents itself in the pure form of tonic or clonic manifestations. However, the defect usually is either predominantly tonic or predominantly clonic, the former being more frequently observed, or at any rate more frequently brought to treatment, since it is a greater social handicap. The speech disturbance is often associated with involuntary movements of the face, shoulders, arms, and even the whole body. It may also be associated with respiratory and vasomotor disturbances.

IV. REVIEW OF THE THEORIES CONCERNING THE ETIOLOGY OF STUTTERING

It is universally recognized that in stuttering there is no structural involvement of

¹ Read at the ninety-eighth annual meeting of The American Psychiatric Association, Boston, Massachusetts, May 18-21, 1942.

From the New York Hospital and the Department of Psychiatry Cornell University Medical College New York.

² Personal communication from Dr. L. Raubich, head of the Speech Improvement Department, Board of Education, New York.

³ Sapir, *Language*, New York, Harcourt, Brace, 1921, pp. xxvii + 258.

⁴ Ombredane, Andre, "Le Langage" in *Nouveau traite de psychologie*, by George Dumas, Alcan, Paris, Tome III, Fas. 4: 363-458.

⁵ Travis, Lee, *Speech Pathology*, New York, D. Appleton-Century, 1931, pp. xxxiv + 331.

the central nervous system. Some of the theories formulated to explain the development of this disorder are briefly given:

1. *Heredity*.—James S. Greene⁶ speaks of a neuropathic diathesis with inheritance of special neuropathological tendencies and general instability of the nervous system as predisposing to stuttering rather than to inheritance of stuttering. To substantiate this claim for a hereditary factor he points out that 40 per cent of the parents of over 1000 patients treated at the National Hospital for Speech Disorders during the year 1935 were stutterers, and these figures are similar to findings in other clinics.

2. *Disturbance in Dominance of Cortical Control*.—Orton and Travis⁷ consider stuttering a deep-seated neurophysiological disturbance which is marked by an inability to control the speech organs. The primary cause of this inability is, according to Travis, the "lack of an inherent bias for the development of a dominant gradient of excitation in the central nervous system to integrate the movements of the organism in the production of normal speech."

3. *Endocrine Disturbance*.—Different theories, not well substantiated, have been presented by Da Costa, Ferreira, Starr, Stratton.

4. *Inadequacy of Conditioned Response*.—C. S. Bluemel⁸ speaks of disturbances in the conditioning of speech and describes therapeutic approaches based on "un-conditioning" and reinforcement of reflex.

5. *Disturbance in the Function of Linguistic Realization*.—Pichon and Borel-Maisonny⁹ consider stuttering as a "linguistic insufficiency" characterized by the inability of the patient to formulate his thoughts in the adequate linguistic form.

6. *Psychoanalytic Conceptions*.—Coriat¹⁰ explains the fluctuations of the speech of

stammerers (clonic-tonic) by comparing them with the early rhythmic movements of sucking. He writes that "the persistence of this primitive pleasure (sucking) produces either thumb-suckers or stammerers."

7. There are other theories related to the disintegration of breathing (Gutzmann), vasomotor changes, disturbance of automatic and voluntary aspects of speech (Kleinfeld, Hoepfner, Tompkins), organ inferiority (Adler), transitory auditory amnesia (Bluemel), personality maladjustments, and bad habits.

V. SUMMARY OF THE CLINICAL STUDY OF 15 STUTTERING CHILDREN

In a clinical study¹¹ the author reviewed 15 cases of stuttering in children. The most conspicuous findings of this study are briefly outlined. In all cases there were anxiety, motor restlessness and fine motor disturbances as well as other psychoneurotic symptoms. In the majority of cases, the onset of the speech difficulty was placed at before 8 years of age, with a greater proportion of these between 2 and 3 years, a finding which is in accordance with the findings of others. Perhaps the most conspicuous psychodynamic factor which was found to operate in the development of the speech disorder was the maternal neurotic attitude in the early eating-speaking situation, which, as described by the writer, takes place roughly between 1 and 3 years of age. Into this early situation there are several developmental phases crowded; namely, change to solid food and self-feeding, walking, sentence formation, initiating of hand preference, and elimination control. The children were found to be shy and over-dependent on their mothers who, as a rule, were disciplinarians and perfectionists. There was a marked frequency of respiratory illnesses. As a group the average weight at birth was a pound less than the average weight at birth of a group of children of similar economic and social status. Anxiety dreams were prominent, and hostility was frequently found with oral aggressive phantasy more marked in the younger children. In a previous study of normal

⁶ Greene, James S., "The Stutterer-type Child," *J. A. M. A.*, 109: 187-191. July 17, 1937.

⁷ Travis, *op. cit.*

⁸ Bluemel, C. S., *Stammering and Allied Disorders*, New York Macmillan Co., 1935, pp. vi + 182.

⁹ Pichon, Edouard, and Borel-Maisonny, S., *Le Bégaiement, sa nature et son traitement*, Masson et Cie, Paris, 1937, p. viii + 99.

¹⁰ Coriat, *Stammering: a Psychoanalytic Interpretation*, New York, Nervous and Mental Disease Publishing Co., 1928, pp. viii + 68.

¹¹ Despert, J. Louise, "Stuttering: a Clinical Study," to be published in the *Am. J. Orthopsychiat.*

children,¹¹ anxiety was found to be associated with transitory speech deviations similar to stuttering.]

VI. A TYPICAL CASE

The following case, not included in the above-mentioned series,¹² is given because the findings are typical and because the child was treated under ideal conditions. Furthermore, a relatively short time having elapsed between the onset of symptoms and the beginning of treatment, the etiological factors are easier to analyze. [This case illustrates the various points which are brought out in more extensive studies: namely, the relation of chewing and speaking in the etiology of stuttering; the mother's neurotic attitudes in the early eating-speaking situation as a psychopathological determinant, as well as a contributing factor in the interference with handedness; the occurrence of respiratory illnesses; the hereditary factor.]

Elizabeth H. was brought to treatment at 3 years, 3 months, for a severe, predominantly tonic, speech defect of 4 months' duration, which had become progressively worse and had been handled by the family in various ways. For instance, whispering at first had helped for a few days, but the child had later stuttered while whispering. The family had also taken the habit of providing words which they felt the child sought.

Family History.—Paternal grandparents described as high-strung. Both are right-handed. Maternal grandfather very tense, right-handed and tended to clutter. The grandmother, a quiet person, had a normal speech. The father, 40 years old, was a prosperous manufacturer, a sensitive person with keen æsthetic drives. He was a quiet, retiring person, although he was said to like people. He was anxious, "nearly got out of his mind" when the family spent part of the previous summer near a lake, because he feared that the children might be drowned. He was right-handed. His speech was clear. He was conscious of always having been too serious. [The mother, 30 years old, was right-handed. She was tense, with considerable variation in moods. She had an 18 months' period of depression following the birth of the patient, during which she neglected the baby and devoted her time to the older child, "to avoid sibling rivalry." She gives as an explanation that she did not have enough physical strength to care for both children. Although the family lives in the country the children have very little freedom in or out of the house. "It's one of those places for adults."]

Personal History.—The patient is the second of two children, the other child being a boy 19 months older than the patient. Pregnancy was not planned but was wanted, the home conditions being then particularly favorable. The mother suffered from nausea for 3 months and was somewhat apathetic during this pregnancy, more than with the older child. The baby was breast fed for only 10 days, feeding being interrupted because of nipple-biting. For 3 months there was difficulty with the formula, but there were no further difficulties until about 1 to 2 years when the child developed hoarding of food, dawdling, and poor appetite. The child was left-handed but was "always changed." The mother's attitude toward feeding radically changed when the child was 2 years old. Previous to this, because of two eugenics seminars taken at a college, the mother had not interfered, but she suddenly decided that "college or no college, the child has got to eat or she will starve." The child was then a little over 2 years and the feeding became a continuous fight among mother, nurse and child. The child was considered a "discipline problem" by the mother because during this period she messed up her food and threw it on the floor. Other habits did not offer difficulties except that the child deliberately soiled her pants to annoy her nurse who vomited as a result. The child is a shy, inhibited little girl, who is afraid of people, especially her father and her brother. She is "an easy victim" for the brother. There was marked inconsistency in handling as regards eating and discipline. Other aspects of the child's developmental history are normal.

When first seen, the child was extremely anxious about coming to the playroom and insisted on her mother being present during the first part of the interview. Later, when the mother left, she went back several times to make sure that she was there. Her play activity consisted chiefly in cooking things for the physician to eat. There was a good deal of oral activity. She realistically chewed on toy chickens, first as children, then as food. She discovered a trumpet, the mouthpiece of which she chewed to pieces, and blew loudly numerous times into the physician's ear. As she initiated and carried out the eating activities she said that she did not like to eat. [Her speech disorder was a severe, predominantly tonic dysfunction with marked spasm of the oral and facial muscles, with occasionally two or three repetitions of a syllable. The child looked markedly anxious while the block lasted, which was, as a rule, from 5 to 20 seconds, and once the spasm was timed to have lasted 45 seconds. The physician did not remark about the speech nor did she manifest any eagerness to know what the child wanted to say. The child was compulsive about putting toys back in place, remembering where she had originally found each. She was over-polite and was overheard saying, "Excuse me," when she had disarranged a toy in the closet, although her back was turned to the physician. During approximately the next six play sessions there was the same predominance of oral activity, chewing the crayons, gestures of taking a toy to her

¹² Despert, J. Louise, "Emotional aspects of speech and language development," *Monatsschr. f. Psychiat. u. Neurol.*, 104: 193-227. No. 4/5 (1941).

mouth, then checking herself, and finally an almost constant tremor of oral muscles which was in the nature of aborted chewing motions. Other oral components were seen in the play phantasy when she said that the girl doll was naughty, "She bite my finger." When she wanted to tell about the little girl who was naughty, she stuttered severely, repeating, "I—sh—I—sh" at least 15 times, some of which was whispered, and finally gave up.]

[The physician asked the mother to give chewing gum to the child and chewing-speaking games were initiated during the second play period. The child enjoyed these and made up numerous speech combinations which she repeated and also hummed. In the interview with the mother the following suggestions were made: relax rigidity of training; give more freedom; offer a great deal of oral activity, trumpets, whistles, lollipops, chewing gum; allow messy activities in specially arranged space; leave the speech disorder completely alone; no coercion; no help. It was suggested that the child, who was over-neatly dressed, come to the office in overalls. Gradually the child became less anxious, more self-assertive, and enjoyed making up words and play with words.] After several sessions, while driving with her mother and brother, she kept the mother's attention for 15 minutes by using a language which was absolutely unintelligible to the mother. This was used not only as a play with words but also as a weapon, because her brother pleaded to know what the patient said; the mother implied that the conversation was a secret between herself and the patient. There was an indication that her dreams were connected with some aggressive activity, because in the course of play, when the physician was to sleep the latter made the statement that she had been dreaming. The child shouted at her, "That's too angry!" In answer to the inquiry as to who was angry, the child said, "Me." The patient became more and more aggressive in the play sessions and later also developed an interest in taking temperatures. There was, coincident with this, some interest in feces, and she once challenged the physician about making a "B. M. on the floor," although she did not carry out the threat. [Coincident with the release of anxiety and the appearance of aggressive behavior, the child's speech disorder took on a different characteristic, that is to say, it became predominantly clonic. The mother was seen at intervals and a discussion of instinctual drives and the emotional needs of children took place, with the recommendation that the child be given as much freedom and sympathetic understanding as possible for what was going to be a trying period of aggressive behavior at home. In the course of these interviews, the mother came to develop some insight into her own feeling reactions in which she expressed a preference for the older child, her rejection of the little girl, and an ambivalent attitude toward her married life which had interrupted a successful career as a buyer and the expression of other

talents. She was encouraged to resume her artistic expression and found a great deal of release of tension in so doing.]

Another trend which was manifested in the child's play was a phantasy of being a boy as big as her brother. She identified herself closely with him and while ill with a cold she cut her hair, explaining later to the physician that she wanted to be a boy, and also that she was angry because her mother would not let her come to the office on account of the cold. The child continued noticeably more aggressive in the play sessions, usually giving the rôle of child to the physician, while she herself, as the mother, carried out aggressive activities in which the physician was to ingest food. She would get very angry and try to push objects into the ears and eyes of the physician, saying, "If you don't take it down this way, you take it down that way," which undoubtedly gave her an opportunity for abreaction of her own feelings. [After a period of 3 months of intensive treatment, the child was free, easy, more aggressive toward her brother and her parents reported that the most conspicuous change at home was that the child was happy. She also eats well, she continues her chewing-speaking games, and her speech is free of stuttering.]

VII. DISCUSSION

In the analysis of this case as well as in other cases, it can be seen that the mother-child relationship in the early chewing-speaking situation is an important one. Many of the mothers of these stutterers are anxious individuals with definite psychoneurotic symptoms. Their anxiety is orally oriented at the critical phase in the child's speech development. It is also in this early situation that interference with hand preference may take place, since it is usually the time when a neurotic mother may feel compelled to insist on the use of the right hand in holding the spoon. In this sense the disturbance of cortical dominance is viewed as one of the factors involved in the complex activities to which many other factors converge. Blanton¹³ and Kardiner¹⁴ have made the observation that patients developing stuttering as part of shell-shock reactions had evidenced stuttering earlier in childhood. The fact that the onset in the majority of stuttering cases takes place in the 2-3 year period adds further evidence. The point of view pre-

¹³ Blanton and Blanton, *For Stutterers*, Appleton-Century, New York, 1936, pp. ii + 191. See page 71.

¹⁴ Kardiner, *The Traumatic Neuroses of War*, New York, Paul B. Hoeber, Inc., 1941.

sented by the writer regarding the etiology of stuttering has a bearing on the therapeutic approach as can be seen by the presentation of the single case. It is interesting to note that Froeschels¹⁵ formulated a theory of the origin of speech in which the close relation between chewing and early speech sounds is emphasized. This concept was arrived at through a quite different approach, but is also utilized by him as one of his techniques in the treatment of speech pathology. [Anxiety, which is present in a severe form in all of the stuttering cases, is not viewed by the writer as a manifestation secondary to the impairment of social communication, since it is observed very early. As a secondary manifestation, however, it is also usually present in the older children and adults. This communication also points to the need of dynamic studies of personality development in stutterers.]

¹⁵ Froeschels, Emil, "Eine neue Behandlungsmethode für taubstummer Kinder," Separatdruck aus, *Ars Medici*, Organ des praktischen Arztes, Nr. 4, 1941—XXXI. Jahrgang.

VIII. SUMMARY

The speech structures are described from the point of view of their relation to the upper respiratory and upper digestive tract. Their utilization in the finely co-ordinated function of speech is also described. The stuttering disorder is defined, and the predominance of tonic or clonic features is emphasized. Associated movements, respiratory and vasomotor disturbances are included. The theories of the etiology of stuttering are reviewed. The findings of a detailed clinical study of 15 cases of stuttering in children are summarized, and the psychodynamic factors analyzed. One typical case is presented from the point of view of anamnestic data, etiology, treatment and course. The importance of maternal neurotic attitudes in the early eating-speaking situation where the transfer of functions of oral structures attains is brought out. Other developmental phases coincident with the period of this early eating-speaking situation are studied from the point of view of contributing factors.

FOOD WASTE AS AN ADMINISTRATIVE PROBLEM¹

T. K. GRUBER, M.D., AND C. A. HAMMOND

Eloise Hospital, Eloise, Michigan

Eloise Hospital serving Wayne County, Michigan, is located sixteen miles west of Detroit. There are from 7000 to 10,000 patients, with an employed personnel of approximately 1800, the number of patients varying with the seasons of the year. The institution is divided into two principal departments; the mental or psychopathic hospital of 3800 patients; the infirmary, which cares for acute, general and chronic hospital patients, infirm and indigent.

Patients are housed in some fourteen buildings, two of which do not have kitchens; however, there is a total of sixteen kitchens serving patients and employees. The sizes and capacities of these kitchens vary greatly, serving from 200 persons to over 6000 persons per kitchen. The largest kitchen served 6700 persons with three complete meals per day during the worst part of the last "depression." Most of these kitchens serve approximately 300 persons.

The majority of patients are served cafeteria style, a goodly number are served as "bed patients," while at other stations food is served by waitresses, particularly in certain employees' dining rooms. There were approximately nine and a half million meals served from all kitchens during the year 1941.

About ten years ago a survey of the garbage problem was started because this might be a key to reducing food costs, as well as improving the quality of food, its preparation and service. A study of eaten and particularly uneaten foods was inaugurated with these ends in view. It was immediately evident that some forms of evaluation, measurement and comparison had to be established before any data could be compiled with an acceptable degree of understanding and accuracy.

Patients are not limited in any way as to amount of food consumed or extra por-

tions served. Uneaten food is described as "table garbage" to distinguish it from other forms of food discards, such as vegetable peelings and similar unavoidable food refuse. Obviously, vegetable peelings, egg shells, fish and fowl offal, bones from soup-stock kettles and kindred items could not be considered as "table garbage." Garbage in general is not necessarily an indicator of food waste or improper preparation and service.

After having determined this "indicator," it was necessary to calibrate the same with some unit of measurement for use in compiling data and comparing results. When reduced to lowest terms and exactly defined, the unit of measurement adopted was *ounces* of "table garbage" per person per day.

Having established the term it was necessary to define "table garbage" to prevent confusion and resultant misconception of the basic idea. *All* food scraps and remains, both solid and liquid, from tables and dishes should be known as "table garbage." Naturally, both edible and inedible parts of foods must be included, as well as the saturating liquids. The approximate degree of permissible saturation was determined by discarding any surplus liquids that would immediately separate and drain from the saturated solids.

For recording purposes a special sheet was designed on which are entered details of table waste per meal for one month, also data as to second portions served, foods furnishing most garbage, etc.

The next stage of control was the establishment of two simple rules: (1) "All 'table garbage' is to be sent to the respective kitchen in provided container and there to be weighed by the cook on duty, in the presence of the dining room attendant, if possible, or any of the kitchen crew available as witnesses." (2) "Data so obtained to be recorded at once upon form furnished each kitchen."

These rules were to minimize the possibility of error and false entry, as well as to insure that records would be kept up-to-date

¹ Read at the ninety-eighth annual meeting of The American Psychiatric Association, Boston, Massachusetts, May 18-21, 1942.

and be presentable for inspection at all times. To further insure the reliability and accuracy of such data, the information is not regarded as confidential, but is accessible to all. This small "light of publicity" has proven a good method of preventing manipulation of records and has reduced error to a minimum.

After having studied the rather bewildering array of figures of the first month's report from the 46 food service stations, it was necessary to transcribe this information as a graph in order to analyze more readily conditions indicated by the changes in the figures from month to month. Tentatively, only a single graph was constructed which recorded the average amount of "table garbage" per person per day in comparison to elapsed time. Each month was represented as one unit of the abscissa or of the progression of the graph. The average amount of "table garbage," in "ounces per person per day," was recorded as one unit of the ordinate or of the altitude of the graph.

The original graph depicted only the month to month general tendencies for the entire institution. Later the desirability of more detailed information was realized.

Finally a graph for *each* food service station was constructed, and these have proven satisfactory. Various other short-time comparison and analysis graphs were constructed to simplify procedure, to facilitate the solution of special problems and to detect unpopular food selections and combinations. These need only to be mentioned because they pertained to circumstances by no means typical of all institutions. However, it may be interesting to compare one of the first graphs of 1932, when this investigation was begun, to one of 1941 to note the marked improvement (Fig. 1).

In order that the following information may be better comprehended, it is appropriate to give some practical idea of an ounce of "table garbage." Three average bread crusts, three and one-half inches in length, weigh one ounce when partially saturated with water. At first, in some wards caring for bed patients, "table garbage" obtained from trays averaged as high as sixteen to seventeen ounces per person per day with a general average of seven ounces for the entire institution. In some dining rooms for aged

and infirm patients, the amount of "table garbage" per person per day averaged from six to twelve ounces when this study was started. These amounts were reduced later to approximately 2 to 3 ounces per person per day. The "table garbage" average for the entire institution has been reduced to 2 to 3 ounces per person per day, which is a *reduction of one ton of "table garbage" per day* for this particular hospital.

These reductions were almost entirely automatic. The mere fact that records were being made and that some persons were seriously studying them, and calling the attention of the persons responsible for preparing and serving food to discrepancies and failures to reduce amounts of "table garbage," in proportion to the reductions made by other food service stations, tended to

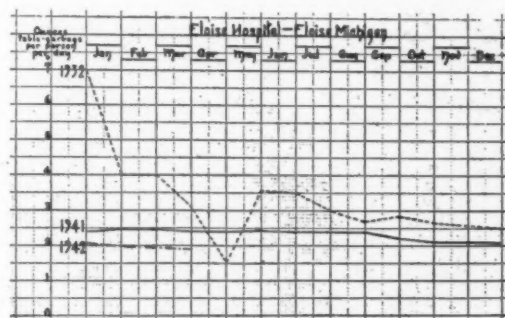


FIG. 1.

create a consciousness of the situation and an alertness that did not exist before.

Several discoveries were made. First, and most important, was that control of the amount of "table garbage" *actually* was control of the gross amount of *all* garbage. Also, close scrutiny of the monthly "table garbage" reports revealed several other facts. For instance, when the daily amount of "table garbage" was high and the number of second portions that day low, investigation generally revealed that the portions of most foods served were too large; or, the particular selection or combination of food unpopular; or, food was not appetizingly prepared. This last condition was usually due to the lack of proper seasoning or cooking.

When the amount of "table garbage" was low and the number of second portions that date high, investigation showed that portions of food were properly served and that

other conditions were normal. When both "table garbage" and number of second portions served were low, a fairly good condition was indicated, which generally could be improved in some way.

When both "table garbage" and number of second portions served were high, investigation generally revealed that one or more of the following conditions existed: First, that some one item of food was being served in unreasonably large portions; second, that some item of food was extremely popular and was being consumed in preference to other foods served with it; or, third, that some item of food was unpopular and not being eaten.

Observation of the monthly reports and of relative actual conditions indicated that sudden and consistent increases in the amount of "table garbage" very often were caused by a lack of cooperation by, or between, employees concerned with food preparation and food service.

Food wastes are always higher at food service stations serving bed patients. Experiment has disclosed that this waste is lowered when fewer coarse foods are served to this class of patients, but that total costs are usually slightly higher despite the lower food waste. This is due, of course, to the fact that this type of food is more costly.

Cafeteria systems of food service automatically lower amounts of food wastes to such a degree that this type of service has been established to the extent that circumstances and equipment will permit.

Garbage control has worked very efficiently. It is not a "cure-all" but it has effected a major degree of economy. It is doubtful if other institutions could use precisely the same plan in detail. Local demands and circumstances will vary greatly, and these facts must be taken into consideration when establishing systems of any kind. To be most successful, a garbage control must be "tailored" to the requirements of each particular institution. Most executives will be surprised at the information revealed; improvements that can be made; economies that can be effected; by properly established methods of evaluating "table garbage."

In evaluating combinations of foods and types of foods producing the least amount

of "table garbage" we have made the following observations:

FRESH VEGETABLES: *Tomatoes*—very popular all summer. *Lettuce*—very popular at all times. *New cabbage*—especially when creamed. *Young onions*—very popular at all times. *Fresh green peas and string beans*—very popular when in prime condition. *Radishes*—very popular at first, declines sharply as season advances. *Spinach* (fresh)—popular all season. *Swiss chard and summer squash*—popularity diminishes rapidly after 3 or 4 times. *Cabbage* (later than "new")—popular at all times, especially as salad. *Carrots*—popular if used in a variety of ways. *New beets*—very popular even if served 3 or 4 times weekly. *Parsnips*—especially popular in spring; *Winter squash*—popular if not served too often per week. *Turnips*—more popular than rutabagas—about once per week. *Rutabagas*—popular if in prime condition and served about once per week. *Old beets*—popularity declines sharply if served more than once per week. *Sauerkraut*—most popular with fresh pork and frankfurters. Wasted unless "prime condition."

CEREALS: *Rolled oats*—always popular. Good grade least waste. *Crushed wheat*—reddest varieties most popular, especially whole "live" cereal, 4th break fairly popular in reddest varieties. Blend of two reds very good—no waste. *Scotch oats*—fully as popular as rolled variety. *Cornmeal mush*—very popular in southern style, white and yellow whole meals. By-product meals far less popular. *Hominy grits*—most popular in finer grinds, probably because mistaken for "cream of wheat." *Wheat hearts*—very popular, no waste—practically same as "cream of wheat." *Mal tex*—very popular, unusually well liked—no waste—maximum food value (higher cost). (*Van Annan*)—plain—cereal recently tried—many second portions. *Whole wheat*—much favorable comment, maximum food value. *Sun ray*—very good cereal, small sample well liked by all. No waste, apparently maximum food value. *Wheat germ*—(5½¢ per lb.) Added to other cereals in natural state just before serving. Waste on practically all decreased after about a week.

Use of cereals made from whole unsterilized grains (with exception of rolled oats) and of newer patent blends of processed cereals resulted in least waste.

FISH: Only use of the better varieties and best quality eliminated waste. *Salmon* (steaked), *chicken halibut* (steaked), *finnan-haddie*—smoked, *cod fillets*, fillets of *haddock* (fresh or frosted) most economical. Hard, frozen fish of all kinds very unsatisfactory and wasteful. *Fresh fish*, especially fresh water pan varieties very popular. *Herring*, *perch*, *pickerel*, *trout* and *whitefish* (fresh) very popular.

EGGS: Only good eggs economical—best grade storage—candled—probably best except fresh eggs. Fresh eggs least waste.

MEATS: Very little waste of any kind except fat mutton and fat pork. Observation has established the conviction, however, that whole carcass

best beef is most economical principally because of greater proportion of edible to inedible parts. *Fat mutton*, wasteful—usually strong-flavored. High shrinkage in preparation and cooking process; large amount of waste when served. *Fat pork*—wasteful—very unpopular. *Trimmed pork* with normal amount of fat, no waste.

CHEESE: Good sharp cheese most popular. Malodored and unnaturally strong cheeses increased wastes greatly, especially when used in entrees.

DRIED VEGETABLES: *Kidney beans*—dark beans far more popular than lighter colored varieties. *Lima beans*—genuine lima beans most popular—so-called "California" lima beans (broad beans) only fairly popular. So-called "Baby lima beans" most wasteful of all. *Blackeyed peas*—fairly popular, especially if not used too often and cooked with pork scraps. *White beans*—navy—very popular if baked (Boston style), also boiled and buttered—all culls, off colors, etc., were off flavor—waste high on these. (*N. b.*—Most cooks overseason baked beans. Finished product should be "dry and entire" with a delicate nut-like after flavor.) *Great northern bean*—even more popular than navy, much better characteristics and flavor, also higher-priced. *Black beans*—popular as vegetable, especially as soup (puree). *Black Mexican turtle beans*—fairly popular—especially when served as a soup ingredient. *Mexican chili beans*—chili con carne with these beans far more popular than with kidney beans, especially when better grade of chili powder was available. *Soy beans*—not popular. Cooks do not understand this bean and extremely difficult to teach preparation. *This bean not thoroughly or fairly tried*. Products of soy beans better liked than bean itself. *Roman or cranberry beans*—very popular, especially in "minestrone" (Italian vegetable soup)—boiled, buttered and also as "baked." *Calico—Pinto—brown swede*—not popular, insipid flavor at best. *Lentils—Austrian*—popular in soup—especially when cooked in old-fashioned iron kettle. *Scotch peas*—greenest variety most popular and best flavored. Other cheap varieties increased food waste greatly. *Split yellow peas*—used only for soup. Best grades most economical. *Split green peas*—used only for soup. (Same as Scotch peas). *Pea-meal* and *Bean-meal*—for soups—better grades more practical than use of raw material. Also used in thickening certain sauces (instead of starches). Very practical and well-liked. *Marrowfat peas*—fairly popular, especially as a soup (puree); also popular when baked as are navy beans.

DRIED FRUITS: Fruits treated with SO_2 best flavor and color when cooked—probably more value. New process—dried fruits best of all in 1941.

COFFEE AND TEA: Probably the major portion of liquids wasted. Much observation and many experiments all tend to show that better grades were most economical in any case owing to greater yield of finished product per pound of material and to better flavor of the finished beverage. Glass-lined beverage systems most economical, sanitary and satisfactory in every way—especially economy of material.

In conclusion herewith are certain pertinent observations:

1. The total garbage, including "table garbage," waste products of food preparation and the like, can be controlled by controlling "table garbage." As "table garbage" decreases, the amount of vegetable peelings decrease, since less vegetables need to be prepared.

2. Size of portions of food served on plate helps determine "table garbage."

3. Types of food served influence "table garbage."

4. Seasoning of food influences "table garbage."

5. Under-cooking or over-cooking of food influences "table garbage."

6. Total food costs can be reduced by a study of "table garbage."

7. Incompetent cooks and careless servers can be eliminated

8. Better balanced meals can be planned and served with a knowledge of what the particular people in the institution like to eat. Food material found on inspection of "table garbage" is most revealing.

9. Inspection of "table garbage" should control food preparation and service; reduce the average amount of "table garbage" to, at the most, two and one-half ounces per person per day.

10. Material that goes into garbage is usually fed to hogs and is a most expensive "hog food."

THE PROPOSED YOUTH CORRECTION AUTHORITY ACT¹

The age group, 16 to 21, has been emphasized as a special problem in youthful criminality because it is the age at which criminal careers so frequently begin. It is also a more promising time of life for dealing with delinquents or criminals than any later period.

In looking over the juvenile laws of the 48 states, the American Law Institute saw the need for a model law which might be universally acceptable. With the plan in mind a committee was appointed as follows:

- Jos. H. Beale, professor, Harvard Law School.
- Honorable Curtis Bok, President Judge, Court of Common Pleas, No. 6, Philadelphia.
- E. R. Cass, executive secretary of the American Prison Association.
- Dr. Sheldon Glueck, professor of criminology at Harvard Law School.
- Leonard V. Harrison, director of the Committee on Youth and Justice, Community Service Society of New York.
- Dr. William Healy, director of the Judge Baker Guidance Center for Children and Youth, Boston.
- Edwin R. Keedy, professor of law at the University of Pennsylvania.
- Wm. Draper Lewis, Director American Law Institute.
- Austin H. MacCormick, executive director of the Osborne Association and former Commissioner of Correction for New York City.
- William E. Mikell, professor of law at the University of Pennsylvania.
- Timothy N. Pfeiffer, New York City.
- Hon. Chas. Poletti, Supreme Crt. Bldg., New York City.
- Dr. Thorsten Sellin, professor of sociology at the University of Pennsylvania.
- Honorable Joseph N. Ulman, Judge of the Supreme Bench of Baltimore.
- Dr. John B. Waite, professor of law at the University of Michigan and reporter for the committee.

This resulted in the drafting of the Youth Correction Authority Act, which was adopted by the American Law Institute in May, 1940.

¹ A progress report of the Committee on the Youth Correction Authority Act of the Section on Forensic Psychiatry presented at the ninety-eighth annual meeting of The American Psychiatric Association, Boston, Mass., May 18, 1942.

This act is designed to rehabilitate rather than to punish youthful offenders. It sets up a Youth Correction Authority of three salaried members with limited powers, to determine the proper treatment for each youth committed to the Authority by the Court, which will commit no one under 21 directly to prison. The law provides for a unified program of correctional treatment, whereas now it is customary for many agencies, their efforts uncoordinated, to deal with an offender at different times. The Authority shall determine matters of probation, institutional segregation and psychiatric or other treatment, and parole. An individual dangerous to society may be held until he is 25 years of age, or by appropriate court order even longer.

For the purpose of cooperating with the American Law Institute in its program of public education which will be necessary before the states adopt the model law, Dr. Walter Bromberg, chairman of the Section on Forensic Psychiatry, appointed a Committee on the Youth Correction Authority Act consisting of Dr. James M. Henninger, of Pittsburgh, Pa., chairman; and Dr. Harvie DeJ. Coghill, of Richmond. When Dr. Henninger was called into active service in the U. S. Navy in January, 1942, Dr. Coghill was appointed chairman.

The aim of this committee has been to try to discover and publish so far as can be ascertained the status of the Youth Correction Authority Act in the 48 states, through the method of a survey by correspondence with prominent state officials in administrative, correctional and welfare positions. Also, to cooperate with the American Law Institute representatives in the hope of stimulating greater interest and paving the way for the adoption of the Youth Correction Authority Act.

The results of a tentative survey are presented in the following table:

STATUS OF YOUTH CORRECTION ACT

State	Youth Correction Act	Some interest shown	More information desired	Comments
Alabama	no	yes	yes	.....
Arizona	no	yes	yes	List of key persons furnished.
Arkansas	no	yes	yes	List of key persons furnished.
California	yes; passed in 1941	yes	no	An advisory panel has been set up.
Colorado	no	yes	yes	.....
Connecticut	no	yes	no	Chief Justice opposed to introduction of Act until after probation law has been passed.
Delaware	no	yes	yes	Act unknown in state.
Florida	no	yes	yes	Have list of key people.
Georgia	no	yes	yes	.....
Idaho *	.....	.....	.....	.....
Illinois	no; rejected in 1941	yes	no	Division for Juvenile Social Adjustment created as substitute for Y. C. Act.
Indiana *	.....	.....	.....	.....
Iowa *	.....	.....	.....	.....
Kansas	no; rejected in 1942	yes	no	Legislative committee more interested in younger children.
Kentucky	no	no	no expres- sion	.....
Louisiana	no	yes	yes	.....
Maine	no	NR	NR	.....
Maryland	no	yes	yes	A commission is considering the Y. C. Act.
Massachusetts	no	yes	yes	A special committee is studying the Y. C. Act.
Michigan	no; rejected in 1940	yes	no	Introduced in legislature with understand- ing it would not be passed, but would be referred to a study committee. May introduce at next session.
Minnesota	no	yes	yes	.....
Mississippi	no	yes	yes	State Association on Crime and Delin- quency will study Y. C. Act.
Missouri	no	yes	yes	.....
Montana	no	yes	yes	.....
Nebraska *	.....	.....	.....	.....
Nevada *	.....	.....	.....	.....
New Hampshire *	.....	.....	.....	.....
New Jersey	no	yes	no	Y. C. Act studied by Juvenile Delinquency Commission.
New Mexico	no	yes	yes	.....
New York	no; rejected in 1941	yes	no	Introduced late in Legislature and did not progress. Plan to re-introduce at next session.
North Carolina	no	yes	yes	.....
North Dakota *	.....	.....	.....	.....
Ohio *	.....	.....	.....	.....
Oklahoma *	.....	.....	.....	.....
Oregon *	.....	.....	.....	.....
Pennsylvania	no; rejected in 1941	yes	no	Y. C. Act was thought of more as an educational measure and was not ex- pected to pass until next session.
Rhode Island *	.....	.....	.....	.....
South Carolina	no	yes	yes	Have list of interested persons and organizations.
South Dakota	no	no	not ex- pressed	.....
Tennessee	no	yes	yes	.....

* No report—NR.

STATUS OF YOUTH CORRECTION ACT—CONTINUED

State	Youth Correction Act	Some interest shown	More information desired	Comments
Texas	no	yes	yes	Committee appointed to draft bill.
Utah	no	yes	yes	.....
Vermont	no	yes	yes	Commission appointed to study laws <i>re</i> children.
Virginia	no	yes	yes	The Children's Code parallels to some extent the Y. C. Act. After reorganization of parole system the Governor plans to study Y. C. Act.
Washington * .....	...	...	...	.....
West Virginia	no	yes	yes	Bureau of Child Welfare interested.
Wisconsin	no; rejected in 1941	yes	no	Further efforts will be made in the legislature Jan. 1943.
Wyoming * .....	...	...	...	.....

* No report—NR.

The situation as it now appears on a basis of incomplete information is as follows:

Bills incorporating the essential features of the Youth Correction Authority Act have been introduced in six states with the following results:

- (1) Introduced and passed in: California, 1941.
- (6) Introduced but failed of passage in: Illinois, 1941; Michigan, 1940; New York, 1941; Pennsylvania, 1941; Wisconsin, 1941; Kansas, 1942.
- (28) No legislative efforts made in: Alabama, Arizona, Arkansas, Colorado, Connecticut, Delaware, Florida, Georgia, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Minnesota, Missouri, Mississippi, Montana, New Jersey, New Mexico, No. Carolina, So. Carolina, So. Dakota, Tennessee, Texas, Utah, Vermont, Virginia, W. Virginia.
- (13) No report received yet from: Idaho, Indiana, Iowa, Nebraska, Nevada, New Hampshire, No. Dakota, Ohio, Oregon, Oklahoma, Rhode Island, Washington, Wyoming.

Total (48)

It will be noted that some interest was shown in 31 of 34 states reporting, and that more information was requested by 23 states. The fact that no report has been received from 13 states indicates the possibility of additional fields in which educational efforts regarding the model act need to be expended.

The war with its manifold effects on civilian life, including the drafting of medical and welfare personnel, will of course re-

tard the development of some of the best provisions of the model act. As Dr. Healy points out, the Youth Correction Authority "will require a specially qualified personnel who shall not only diagnose the needs of the individual from many standpoints and allocate him to special groups, but who shall also carry out the training and treatment program—that is if he is regarded as an institutional case."

Because of the present situation due to the war with the prospect of a general increase in juvenile delinquency, it may be necessary before the coming of peace to include in the functions of this committee an inquiry into the mental hygiene and other facilities which might be necessary in the promotion of the Youth Correction Authority Act in all of the 48 states.

In the meantime, the committee should continue its efforts to cooperate with the American Law Institute and local committees of the states in their educational efforts.

SUMMARY AND RECOMMENDATIONS

The Youth Correction Authority Act was created by a committee of the American Law Institute. It is a model law which attempts to prevent repeated crime in the 16 to 21 group of youthful offenders through a coordinated effort to provide suitable treatment.

The status of this model act is the subject of a nation wide survey or inquiry made by the Youth Correction Act Committee of the Section on Forensic Psychiatry of the American Psychiatric Association.

The situation as it now appears on a basis of incomplete information is as follows:

Bills incorporating the essential features of the Youth Correction Authority Act have been introduced in six states with these results:

California, introduced and passed in 1941.

Introduced but failed of passage in Illinois, 1941; Michigan, 1940; New York, 1941; Pennsylvania, 1941; Wisconsin, 1941; Kansas, 1942.

No legislative efforts were made in 28 states.

No report has been received yet from 13 other states.

Some interest is shown in 31 states and requests for more information have been received from 23 states.

A committee is active with Congress in establishing a uniform youth correction act dealing with Federal regulations.

In view of the foregoing, it is recommended that your Committee be empowered (1) to continue its inquiry into the status of, and facilities for carrying out the provisions of the Youth Correction Act throughout the United States, and (2) continue to cooperate with the American Law Institute and local committees in the states in their educational efforts.

Respectfully submitted,

HARVIE DEJ. COGHILL, M. D.,

Chairman,

Committee on Youth Correction Act.

COMMENT

MENTAL HEALTH ADMINISTRATION IN CALIFORNIA

It has long been apparent to the members of The American Psychiatric Association that the effectual fulfilment of a mental health administrative program for a given state, or a given jurisdiction, involves not only the development of an executive department or agency charged specifically with carrying it into effect, but the appointment of a competent, reliable and experienced physician to administer such a program; with a rate of compensation in keeping with the kind of service required; and with a tenure of office based upon qualifications and merit.

When the newly elected Governor of California announced in January, 1943, the appointment of a non-medically trained person as Director of Public Institutions, he almost in the same breath announced the appointment of a State Director of Public Health who is competent and experienced in that field. In connection with the latter appointment he proposed legislation to amend the state health and safety code (Assembly Bill 686) so as to require that the State Director of Health shall be a doctor of medicine, eligible to license to practice in California, with at least one year's post-graduate training in public health, and a minimum of five years' practical experience as an administrative officer in a well organized health department; and furthermore, that the position shall be under civil service classification and pay an annual salary of \$10,000. No such program obtained with reference to the appointment of a Director of Public Institutions.

The new Director of Institutions in California is a graduate lawyer, admitted to the California Bar in 1927, and authorized to practice before the California District Court of Appeal, the Southern District Federal Court, and the Supreme Court of the United

States. She was for some two years a juvenile court assistant and referee of the Los Angeles Juvenile Court, and since October, 1938, has held the position of Commissioner of the Superior Court, hearing all male juvenile delinquency cases appearing before that court.

She has for a number of years been a member of the Board of Trustees of the National Florence Crittenton Association; a member of the Board of Directors of the California Conference of Social Work; President of the Board of Directors of the Los Angeles Florence Crittenton Home; a member of the Community Welfare Federation; and a member of several committees of the Council of Social Agencies of Los Angeles. She brings to the Department of Institutions, therefore, a background of civic interest and social field experience.

There are some errors of omission and commission in the mental health administrative measures employed as a function of the executive department of the state government. The new director, however, has recognized the need for medical guidance, and is proposing, with the approval of the Governor, the creation of a Medical Advisory Committee for the Department. Its purpose is to develop a satisfactory state program for mental health administration, for submission to the next biennial meeting of the Legislature. The Medical Advisory Committee contemplated, embraces talent conversant with patient needs. Its members have had long practical experience in this important medical administrative field.

The Association looks forward with hope and anticipation that mental health administration in California will be placed on a par eventually with that of public health.

DR. TIFFANY RETIRES AS COMMISSIONER OF MENTAL HYGIENE

Dr. William J. Tiffany, New York State Commissioner of Mental Hygiene, retired April 1, 1943, having served in that position since Oct. 1, 1937.

As one of the senior men in psychiatry Dr. Tiffany had been continuously in the New York state service for nearly 37 years, since his appointment as medical interne at the Binghamton State Hospital in 1906. He acquired a richly varied experience in several of the larger hospitals, and this experience gave him a comprehensive knowledge of the entire range of hospital activities and of hospital needs. He had served as pathologist at the Binghamton and Manhattan State Hospitals and as director of clinical psychiatry and superintendent at Kings Park Hospital. He was therefore eminently fitted to take charge of the new super-institution, the Pilgrim State Hospital, which was opened in 1931. When six years later Commissioner Parsons retired from his post at Albany, Dr. Tiffany was the natural choice to succeed him, and he was accordingly appointed Commissioner of Mental Hygiene by Governor Lehman.

The splendid mental hygiene organization built up by Commissioner Parsons was ably and devotedly carried forward by Commissioner Tiffany who enjoyed the confidence and cooperation of his colleagues in the service, and whose solicitude for the welfare of the 80,000 patients in the 26 institutions of the state was a matter of habit.

The problems of wartime, with grievously depleted personnel throughout the state service as men and women in increasing numbers entered the armed forces and war industries, laid additional heavy burdens upon the Commissioner's office. These Dr. Tiffany assumed, and to contribute his full share to the war effort, he delayed the retirement he had contemplated in the autumn of 1942 until the political situation at Albany this spring decided him to postpone the step no longer.

As he leaves office he carries with him the respect and esteem of his colleagues in the New York State Service and in The American Psychiatric Association.

REDUCED SUBSCRIPTION RATES FOR STUDENTS

The Association approved, at the annual meeting in Detroit, a recommendation of Council that the JOURNAL be supplied to undergraduate medical students at one-half the regular subscription rate. When the proposal of a concession to students who might wish to enter personal subscriptions was laid before Council, it met with hearty and unanimous endorsement. It was felt not only that undergraduates were entitled to this advantage, but that in view of the increasing demand for qualified psychiatrists and of the importance of bringing psychiatric problems

and viewpoints more prominently into the medical teaching program, any move should be sanctioned which would make more easily available the literature of psychiatry to the coming generation of medical men and women.

Accordingly medical schools throughout the country will be informed that beginning with volume 100, July 1943, the subscription rate for medical students to the AMERICAN JOURNAL OF PSYCHIATRY will be three dollars per annum.

NEWS AND NOTES

PANAMERICAN NEUROPSYCHIATRIC CONGRESS.—Announcement has been made that the third Panamerican Neuropsychiatric Congress, postponed from November 1942, will be held in Buenos Aires in November 1943.

The Congress is under the presidency of Dr. Nerio Rojas, and the committee on arrangements includes representatives from Argentina, Bolivia, Brazil, Chile, Ecuador, Mexico, Peru and Uruguay.

Communications may be addressed to the general secretary, Dr. Felipe M. Cia, Instituto de Medicina Legal, Cordoba 2122, Buenos Aires, Rep. Argentina.

FOLLOW UP OF DRUG ADDICTS.—A follow-up study of 4766 narcotic drug patients released from the U. S. Public Health Service Hospital, Lexington, Ky., reported by Michael J. Pescor (Supplement 170, Public Health Reports, 1943), showed that, excluding the dead and unknown cases, 74.7 per cent relapsed to the use of drugs. Forty-three per cent were readmitted to the Lexington Hospital or other institutions or both.

PSYCHIATRIC SOCIAL SERVICE IN WAR WORK.—Luther E. Woodward, Ph.D., of the Child Guidance Bureau of the public schools of New York City, has been granted a year's leave of absence to serve on the staff of the National Committee for Mental Hygiene in its war work program.

He will visit various states to organize psychiatric social service facilities which will be placed at the disposal of the Selective Service system to aid medical examiners of local draft boards and the psychiatrists of induction stations in screening out men who are mentally unsuitable for military service.

Several hundred trained volunteer psychiatric social workers are already cooperating with draft boards and many more are needed to carry on the social investigation of the school, employment, and eventual insti-

tutional history of inductees. The value of the information provided by this service has been amply demonstrated.

YALE POLIOMYELITIS STUDY UNIT.—The National Foundation for Infantile Paralysis announces a five-year grant, totaling \$150,000, to the Yale University School of Medicine for the establishment of the Yale Poliomyelitis Study Unit. The term of the grant will conclude June 30, 1948.

The unit will take over and extend the work of the Yale Poliomyelitis Commission which was established in 1931. Its laboratories will afford opportunity for training of workers qualified to pursue definite lines of investigation and its facilities will be available to the National Foundation, if required, in time of epidemic.

The new unit will be under the direction of Dr. John R. Paul, professor of preventive medicine in the Yale University School of Medicine.

ARMY OUTPATIENT PSYCHIATRIC SERVICE.—Unique among Army medical services is the out-patient department of psychiatry at Mitchell Field, N. Y., where soldiers with emotional and mental problems may receive advice and treatment without hospitalization.

Since the clinic was established in the autumn of 1942 many soldiers have availed themselves of this consultation service and have been helped to make the difficult psychological transition from civilian to military life.

Major Benjamin H. Balser is chief of the neuropsychiatric service at Mitchell Field, which provides also an in-patient ward. The staff includes First Lieutenant William L. Fearing of the Medical Corps and Second Lieutenant Margaret L. E. Kram of the Army Nurse Corps; all these officers have had extensive experience in neurology and psychiatry.

Enlisted men have sought advice from the out-patient department of their own accord, or have been referred by their commanding officers, by medical officers, and by medical and personnel boards on the field. One such authority is the Office of Police and Prisons, generally known as the Provost Marshal, which refers certain soldier prisoners to the clinic for examination on the possibility that mental illness—sometimes as mild as homesickness—is the basis for misbehavior. In many cases the punishment will be qualified according to the report of the clinic. The psychiatrist is frequently called on to testify at courts-martial involving such prisoners.

The neuropsychiatric service has achieved a high rehabilitation rate, as many as 75 per cent of the patients disposing of their problems without further treatment. Discovering and dealing with soldiers' problems early is the secret of this success. On every out-patient, as on all in-patients, a detailed social history is prepared by an experienced Red Cross investigator. Following a fixed questionnaire, the investigator fills out a complete study of the childhood, schooling, family background, social and industrial history. With this and his military record as a guide, the neuropsychiatric service is able to treat each soldier as an individual.

Every effort is made to follow-up successful treatment by encouraging the former patient to keep in touch with the medical department. The hospital has a large file of letters from enlisted men serving all over the United States, telling how they are getting along and invariably paying tribute to the help the neuropsychiatric service gave in "making me a good soldier."

SYMPOSIUM ON MILITARY PSYCHIATRY.—The Michigan Society of Neurology and Psychiatry devoted its meeting of March 25, 1943, to a round table discussion on the subject "The Importance of Neuropsychiatry in the Selection of Men for the Armed Forces." Dr. John M. Dorsey presided and Dr. Thomas J. Heldt acted as Moderator.

The speakers included Colonel Leonard G. Rowntree, M. C., A. U. S., Medical Director of the Selective Service System; Brigadier

General LeRoy Pearson, M. C., A. U. S., Director of the Selective Service System for the State of Michigan; Lieutenant Colonel William C. Menninger, M. C., A. U. S., Neuropsychiatric Consultant to the Fourth Service Command, Medical Branch, Atlanta, Georgia; Commander Francis J. Braceland, M. C., U. S. N. R., National Naval Medical Center, Bethesda, Maryland; Major Clarence I. Owen, M. C., A. U. S., State Medical Officer, Selective Service System, State of Michigan, and Lieutenant Colonel Roscoe W. Cavell, M. C., A. U. S., Senior Medical Officer, Detroit Army Induction Station, Detroit, Michigan.

The purpose of the symposium was to bring together representatives of the Selective Service System and the Armed Forces in order to promote a better mutual understanding of the neuropsychiatric problems in the selection of men and to emphasize the need for recognition of potential neuropsychiatric casualties. The meeting was open to physicians and officers of the local draft boards. The remarkable interest shown by the representatives of the Selective Service System suggests the value of holding similar meetings in other sections of the country.

DEATH OF DR. JOHN RATHBONE OLIVER.

—One of the most versatile psychiatrists of our period passed away January 21, 1943, in his seventy-second year. The issue of *Time* for February 1 gives an intimate picture of his activities and briefly describes some of the high points of his colorful career. After leaving Harvard in 1894 he taught for two years at St. Paul's School, Concord, N. H. He then started out as a priest of the Episcopal Church from which he was later debarred. Perhaps he asked to be deposed because, as the account says, he lost his faith. Going to Europe he joined the Roman Catholic Church, again studied for the priesthood, again lost his faith, and turned to medicine, graduating from Innsbruck University in 1910, and serving as a lieutenant in the Austrian Army in 1914-15. After a period spent chiefly in Paris he returned to America and for a year or more was on the staff of the Phipps Psychiatric Clinic of the Johns Hopkins Hospital, Balti-

more. Following this he served as medical adviser to the Supreme Court of Baltimore where he did valuable work in aiding justice to temper punishment with mercy, or perhaps with common sense. In 1917 he became interested in Mount Calvary Episcopal Church which in name only is not Roman Catholic. He formed a close connection with this institution and took part in high mass each Sunday. Later he became adviser or house master to students in the dormitories of Johns Hopkins University at Homewood. Still later, ill health forced him to give up this position.

At one time Dr. Oliver gave a most interesting short course in medical history at the University of Maryland and was also lecturer in the same subject at the Johns Hopkins Medical School.

In his first novel, entitled "Fear," the hero or leading character was easily identified as himself. This work was followed by "Victim and Victor" which almost secured the Pulitzer Prize, and by "Four Square," purely autobiographical and indicating how he had placed himself four-square with his world. Others of his books seem to have gained less attention.

In his personality Dr. Oliver was a charming gentleman. He was a diligent student and a clear writer whose contributions were engaging if not of great scientific value. Those who knew him will regret the passing of a congenial associate.

THE INSTITUTE OF LIVING.—At the time of the founding of the Hartford Retreat more than a hundred years ago, the name "Retreat" was geographically suitable. Since then the city has surrounded it; and latterly the hospital has been known as the Neuropsychiatric Institute. Now in his 119th annual report Dr. C. C. Burlingame announces a change of name to "The Institute of Living" to reflect present day psychiatric methods and prospects. The number of admissions during the past year (650) was the highest in the Institute's history, and the census of patients was nearly double that of twelve years ago when the present administration took over.

Climaxing the building program of recent years was the completion of the new spacious research laboratory which can be turned over for war purposes if required.

A noteworthy development is the program of educational affiliation which has been effected with several of the Panamerican countries. Fellowships providing residence for work at the Institute have already been granted to qualified physicians from Canada, Peru and Mexico, and correspondence is in progress with other countries.

An especially valuable service is the making of abstracts of psychiatric literature which the Institute has been sending out regularly for several years and which are widely circulated and utilized.

BIBLIOGRAPHY ON INFANTILE PARALYSIS.—A project which will make The National Foundation for Infantile Paralysis the only complete central, authentic source of information on infantile paralysis in the world has been announced by Basil O'Connor, president of the Foundation.

A complete bibliography of all scientific literature ever published in any language pertaining to infantile paralysis is being compiled by the Foundation, and is expected to be ready for publication in book form in the early part of 1944. The first volume will contain a record of all scientific material on poliomyelitis published in the world up to the end of 1943. Subsequently, the data will be kept up to date by annual supplements. Brief abstracts of the more important articles will be included in the bibliography.

The compilation of the information is being carried out for the Foundation with the aid of the library of the American Medical Association and the John Crerar Library, both in Chicago, under the direction of Morris Fishbein, M. D., editor of *The Journal of the American Medical Association*, and Dr. Ludwig Hektoen, Chicago, editor of the *Archives of Pathology*, with the assistance of Miss Ella Salmonsens of the John Crerar Library.

Through the work of the International Committee for the Study of Infantile Paralysis, organized by Jeremiah Milbank in 1928, much time has been saved in the com-

pilation of the early literature. The committee, prior to its dissolution in 1932, had collected data on all literature regarding the disease published up to that time. These data, now the property of the Library of the New York Academy of Medicine, have been turned over to the National Foundation for inclusion in the publication.

AMERICAN RED CROSS OFFERS 75 MEDICAL AND PSYCHIATRIC SOCIAL WORK SCHOLARSHIPS.—Seventy-five scholarships in medical and psychiatric social work will be made available to eligible candidates between July 1, 1943, and July 30, 1944, by the American Red Cross. These are a continuation of the program initiated last December, under which approximately 60 scholarships have been granted.

Upon successful completion of the scholarship training, students will be assigned to positions on Red Cross staffs in military hospitals where the need for well-qualified personnel has rapidly expanded because of the war.

Candidates may designate the school of their choice from a list offering approved courses in medical and psychiatric social work. Educational requirements include successful completion of one year of graduate work in an accredited school of social work, and it will be necessary for each applicant to apply directly to the school of his choice to obtain approval for admission. Awards of full tuition and \$65 a month for maintenance

will be made according to the individual qualifications of the applicant in order of receipt of the applications by the assistant director of Red Cross Military and Naval Welfare Service, Hospital Service, in the four following Red Cross area headquarters: North Atlantic Area, 300 Fourth Avenue, New York City; Eastern Area, 615 North St. Asaph Street, Alexandria, Virginia; Mid-western Area, 1709 Washington Avenue, St. Louis, Missouri; Pacific Area, Civic Auditorium, San Francisco, California.

Application forms may be obtained from any of the above addresses or the Personnel Training Unit, Services to the Armed Forces, American Red Cross, Washington, D. C.

SUMMER COURSES IN GENERAL SEMANTICS.—The Institute of General Semantics, Chicago, announces an intensive seminar of forty hours of lectures and individual work with Count Korzybski and staff, to be held Aug. 28 to Sept. 7, 1943. Enrollment is limited to thirty, and application, accompanied by registration fee of \$10, should be made at once.

Tuition charge for the course is \$50, which includes registration fee. A registration of at least fifteen students will be necessary in order that this seminar may be given.

For application forms or further information address Miss M. Kendig, educational director, Institute of General Semantics, 1234 East 56th St., Chicago, Ill.

NOTICE TO MEMBERS AND SUBSCRIBERS

The United States Post Office has issued regulations affecting 178 cities in the United States whereby all mailing addresses in the cities affected must now include the Delivery District Number. Addresses will be considered incomplete unless the Delivery District Number is indicated on all mail.

Each member of the Association and each subscriber to the JOURNAL is requested to notify the New York office at once what

Delivery District Number (Zoning Number) has been assigned to him. Every resident of the 178 cities concerned will be expected to have such a Zone Number. In case of change of address the office should be informed immediately of the new address with the new Zone Number.

Please address Mr. Austin M. Davis, Executive Assistant, Room 924-25, 9 Rockefeller Plaza, New York 20, N. Y.

BOOK REVIEWS

DOCTORS OF THE MIND. By Marie Beynon Ray. (Boston: Little, Brown and Company, 1942.)

This book is obviously addressed to a lay audience rather than to psychiatrists. It is melodramatic in style, lurid in phrase and shrill in its echoing of sharply controversial issues and personalities. Maybe the public likes this sort of writing. Certainly there is a portion of the public which enjoys having doctors roasted and toasted, as has been proven by the great success of another current popularizer of medical controversies. It seems to your reviewer, however, that such titillating tactics are of dubious net value in orienting the sober public to an effective appreciation and support of sound psychiatry.

The substantial body of statements presented here constitutes, however, an impressive monument to the author's diligent library researches and interviews. The first topic extensively considered is the brain, and the speech functions. Broca is naturally given the spotlight, very effectively, and charmingly. Localization of speech and other functions is expounded—with the aid of two pictures (the only two in the book) in which brain maps are superimposed on portraits of Shakespeare and Napoleon. Under the provocative chapter heading "No Psychologists Need Apply," are interesting statements about Hughlings Jackson, Brown-Séquard, Abel and Kraepelin. The renowned editor of some nine volumes of *Psychologische Studien* might have been puzzled by this chapter heading, but the next section "The Three Grand Old Men" make it somewhat clearer that "psychologist" is defined as if from Vienna, rather than from Leipzig.

An account of Wagner-Jauregg's malaria treatment of general paresis receives the inevitable chapter heading "Fighting Fire with Fire."

A passionately dramatic account of Sakel's early experiments on the hypoglycemic treatment is followed by less highly colored statements of the shock methods introduced by Meduna, and Cerletti. Other related matters presented are the use of curare (Bennett) in convulsive treatments, nitrogen inhalation (Himwich) and prefrontal lobectomy (although no mention is made of Moniz or of Freeman and Watts).

There is a clear section on epilepsy, electroencephalography and dilantin.

The interviews with "middle-of-the-road" psychiatrists offer rather clever though inadequate characteristics of the therapeutic points of view of Meyer, Myerson, Overholser and Burlingame.

On the whole the book is a flamboyant but interesting and relatively well fortified presentation of some of the more dramatic personalities and issues in psychiatry. The most serious defect—and in this case a dangerous defect—is a lack of insight into psychotherapy.

JOHN C. WHITEHORN, M.D.,
Johns Hopkins University.

CHILDREN'S DREAMS. An Unexplored Land. By C. W. Kimmins, M.D. (New York: W. W. Norton & Co., 1942; London: George Allen & Unwin, 1937.)

The subject of dreams became of clinical importance with the advent of Freud. The book under review concerns itself with a large material made up of the dreams of English children. A good deal of the literature is summarized and effectively worked into the point of view of the author.

The difference between the dreams of boys and girls is considered, and the various factors that increase or decrease types of dreams are discussed. Thus the author considers the factors of blindness and deafness as determining the type and content of the dreams. Social position, incarceration in reform schools and many other variables are duly weighed as to their effect upon the dreams of children.

An interesting and valuable fact bearing on the somatopsychic genesis of dreams is given on page 59.

"The fact that very young children dream far less about food than the older children indicates that they are the last to suffer in the case of food shortage in the home. The dream is a sure indication of the position of the child in this respect, as is clearly shown by a comparison of the proportion of food dreams among children in poor and well-to-do districts. The child who dreams frequently about food may reasonably be assumed to be an underfed child. A striking case is recorded of the value of the dream in this connection. A well-known investigator was carrying on a research on the physiological effects of a short period of starvation. He remained without food for six days, and after the first day was not conscious of any personal inconvenience, but every night he dreamed of having hearty meals, though he had never experienced this type of dream before. On resuming his normal life the food dreams ceased."

This more clearly points out the origin of dreams than all the complicated and ingeniously subtle analyses which postulate unconscious and conscious in a battle mediated by a censor and "known" as its meaning by a crude and arbitrarily selected symbolism.

The one difficulty with all dreams, and especially night-dreams, is that in reality the record given by the dreamer the next day, or even the next hour, is probably as inaccurate an account of a psychological experience as there is in the whole field of human existence, and especially, I should think, this would be increased in the case of children. In this connection, it is interesting to note that none of his boys or girls apparently had direct sexual dreams, even though some of the individuals were 16 and 17 years of age. This is very good evidence that the children have not been frank or accurate about the contents of their dreams.

For some reason, Dr. Kimmins links up what is wrongly known as the day-dream with the night-dream. I believe they belong to quite different categories of significance and importance, the day-dream being far more important, since it more nearly represents the total personality of the individual, while the night-dream is, I believe, mainly a result of disordered sleep.

It will take a great deal more work than even that of this industrious and zealous author to make dream material scientific. With all of the limitations indicated in this brief review, the book deserves a place in the library of the psychiatrist.

A. MYERSON, M.D.,
Boston State Hospital, Boston, Mass.

THE RORSCHACH TECHNIQUE. By *Bruno Klopfer and Douglas M. Kelley.* (Yonkers-on-Hudson: World Book Company, 1942.)

In this book the authors have presented the most comprehensive exposition of the Rorschach experiment published in English.

The book is conveniently divided into four sections, the first of which deals with the history and objective of the method. The second section is an inclusive discussion regarding the administration of the method. The third section deals with interpretation of the results; and the fourth section is a discussion of the clinical psychiatric application of the procedure. These divisions are clearly and simply written, but such a wealth of detail and information is provided that repeated reading may be necessary by the student. On the other hand, the book will serve as an excellent reference for those familiar with the Rorschach technique.

One would wish that the authors had felt free to use colored reproductions of the cards employed in the method, and the inclusion of more Rorschach records would probably have made the technique more intelligible to the beginner.

R. MILTON FINNEY, M.D.,
Houston, Texas.

PRINCIPLES OF NEUROLOGICAL SURGERY. Second Edition. By *Loyal Davis, M.D.* (Toronto: Macmillan Co., 1942.)

In the preface the author states that this book is written for the practitioner of medicine and the medical student and not especially for the experienced neurologist or neurological surgeon.

The book is unnecessarily long for its purpose. The medical student or practitioner need not be concerned with the various technical procedures outlined in the chapters on brain abscess, intracranial tumours, etc. Rather is he concerned with a reasonably accurate suspicion that such a surgical lesion may exist in his patient. When he turns to this book for help in diagnosis he is likely to be confused by a detail which only a trained neurologist or neuro-surgeon can appreciate. The essential points in any given diagnosis are not sufficiently stressed. Parts of the book will interest neurologists and neuro-surgeons. It is of especial

value and interest to those house surgeons who are training for the career of neurological surgeon.

One would suggest that the chapters on "Neurological Diagnosis," "Surgery of the Autonomic Nervous System" and "The Surgical Treatment of Essential Hypertension" be omitted. In their place post-operative care could well be given more prominence. A chapter on the indications and contra-indications for lumbar puncture would be valuable.

The book is well illustrated and there is much of value in it; yet it cannot be highly recommended for students and practitioners.

K. G. MCKENZIE, M.D.,
University of Toronto.

YOUR PERSONALITY: INTROVERT OR EXTRAVERT? By *Virginia Case.* (New York: Macmillan Co., 1941.)

This popular exposition of personality types is based chiefly on the concepts of Jung and his followers, with which most psychiatrists are familiar, and on supporting evidence from psychiatric and psychologic literature. It sets forth two basic psychological types which are frequently misunderstood. Their relationships with other personalities are summed up for the introvert as incorporation and for the extravert as rapport. They are analyzed and explained by four portrait sketches. How these types appear to the world and to each other; how they deal with their experiences and express themselves; how they judge and misjudge each other; and how they compare in marriage and group relationships are topics receiving extensive discussion. Ambiversion, or the cultivation of the opposite side of the personality, is given some consideration. Comments on the temperaments of many famous persons and interpretations of their personalities have been based on their literary or other creative productions, and on their reported behavior.

It is well known that personalities and temperaments may be classified in many ways in accordance with the position or viewpoint of the classifier, or in keeping with certain general assumptions and rules. Many unsuccessful or useless attempts have been made to classify human beings according to physical and psychological types, but occasionally the result is of some help in psychiatry, as is the case with Jung's concepts. A certain residual of these concepts which were more fashionable a few years ago than at present, has found a place in our thought and work on personality construction and mental disorder. However, no one of these has proved to be of any great practical value to the psychiatrist, who encounters numerous combinations and mixtures which do not seem to fit into the scheme.

At some future time, in the light of additional information gained by research, it may be possible to classify personalities on the basis of a dynamic analysis of the reaction patterns of the total individual. In the meantime these attempts are little else than interesting mental exercises. As the

trained psychologist and psychiatrist frequently encounter difficulties in trying to judge an individual in terms of "introversion" and "extraversion," one can imagine how accurate the layman will be in recognizing and evaluating his own personality characteristics, as well as those of other individuals; and how successful he will be when he acts in accordance with the estimations. Reliable self-understanding is seldom to be gained from books on the subject.

In this, as in most popular expositions of matters not yet settled by experts, the subject is made easy with many concepts of mind functions stated as facts, while they are still highly controversial and in stages of thought provocation. Although the book is another of the countless, pseudoscientific publications which are now streaming through the presses for popular consumption, it will make interesting reading for the public and at best may lead to some special recognition and tolerance of the other fellow's peculiarities.

There are chapter summaries, suggested supplementary reading and a bibliography which readers should find helpful.

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INTENTION AND SURVIVAL. By T. Glen Hamilton, M.D., F.A.C.S. Edited by J. D. Hamilton, M.A. (Toronto: The Macmillan Co. of Canada, Ltd., 1942.)

The studies and experiments in psychical research recorded in this volume were carried on by Dr. Hamilton of Winnipeg over a period of seventeen years, until his death in 1935. His records have been arranged for publication by his son, J. D. Hamilton.

Dr. Glen Hamilton was lecturer in clinical surgery in the Medical Faculty of the University of Manitoba, and a member of the gynæcological staff of the Winnipeg General Hospital. He had served as president of the Manitoba Medical Association and as a member of the executive committee of the Canadian Medical Association. These personalia will indicate his standing in the medical community. He was a deeply religious man and for many years was an elder of his kirk. There can be no question of his good faith during his long sustained adventure in metapsychics.

His experiments and observations engaged the interest of such world figures as Sir Oliver Lodge and Sir Arthur Conan Doyle; the latter attended a séance in Dr. Hamilton's home. The reviewer recalls that when the British Medical Association met in Winnipeg in 1930, although Dr. Hamilton had no place on the program, he gave independently during the session an address, the attendance at which compared rather better than favorably with that at some of the regular meetings. During the

next two or three years he gave illustrated lectures on mediumistic phenomena before the Toronto Academy of Medicine and before the American Society for Psychical Research in New York and Washington.

As background for his studies, Hamilton reminds his readers that Sir William Crooks began his serious consideration of psychic manifestations in 1869, and that later as President of the British Association for the Advancement of Science he maintained his position of acceptance, believing that he had "glimpses of something like coherence among the strange elusive phenomena." He adduces also the authority of William James, Charles Richet, Schrenck-Notzing and other serious persons who had interested themselves in or attempted to traverse the obscure domain.

Hamilton's principal concern was the demonstration of 'teleplasm', first observed by Richet in 1905 and named by him 'ectoplasm'—"a substance of some kind which may give rise to various *simulacra* and has its biological source in the medium's body. . . . It issues mainly from the medium's eyes, ears, nose and mouth; in its initial state it may be either vaporous or solid; the former usually quickly condenses to form the latter which can take on various aspects: some may be quite amorphous or shapeless, some may show a semi-organization which is purposive—for example, pseudopods which form hand *simulacra* capable of picking up objects; and still others may show a progressive differentiation until they appear as mature biological faces, fingers and hands."

Hamilton operated with a battery of eleven cameras variously placed in his séance room, with which he made some three hundred photographs of teleplasms produced by one particularly fertile medium, "Mary M." Many of these appearances are reproduced in the text. Among the portrait teleplasms occur the likenesses of the English divine, C. H. Spurgeon, Conan Doyle, Raymond Lodge (son of Sir Oliver) and others.

Dr. Hamilton was not unmindful of the possibility of fraud in spiritistic phenomena, and he took what he believed to be effective precautions. The compiler of the present volume mentions but does not discuss the subject "for the very good reason that fraud did not and could not exist in the Mary M. experiments," at any rate no fraud was discovered.

The material in this book, which includes also a good many 'communications,' is not unlike that of which the annals of psychical research are full. It presents data which have convinced the author of the existence of "psychic entities" which can make their presence known through physical influences and verbal communication. For the uninitiated the data may not seem evidential. The book remains however a record of strange and interesting experiences and constitutes an intriguing human document.

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